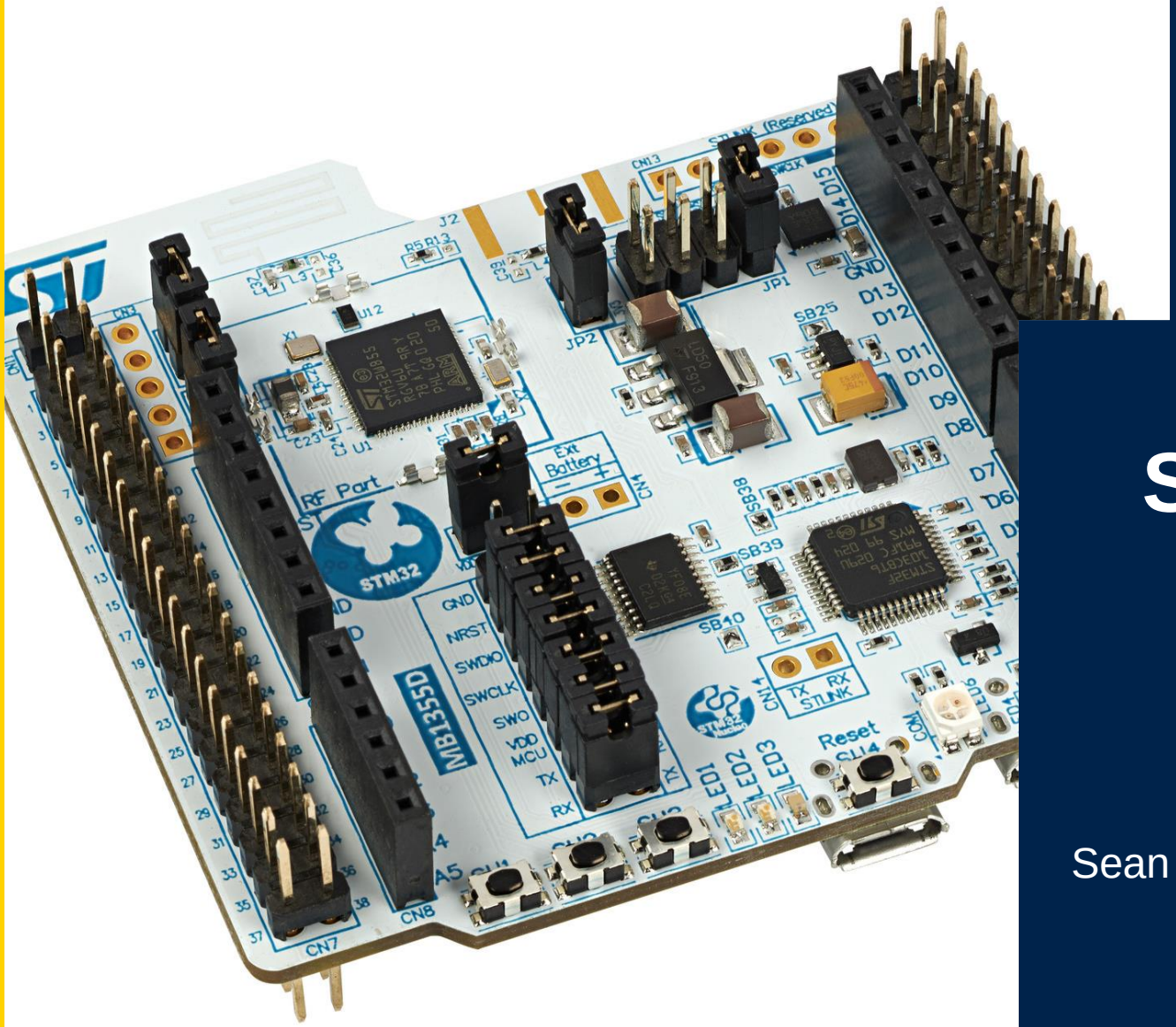

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STM32WB를 이용한 제품 개발 시작 안내서

BLE & ZigBee & Thread

Sean Park

Agenda

- # STM32WB development environment
- # How to study STM32WB
- # STM32WB information collection
- # QnA

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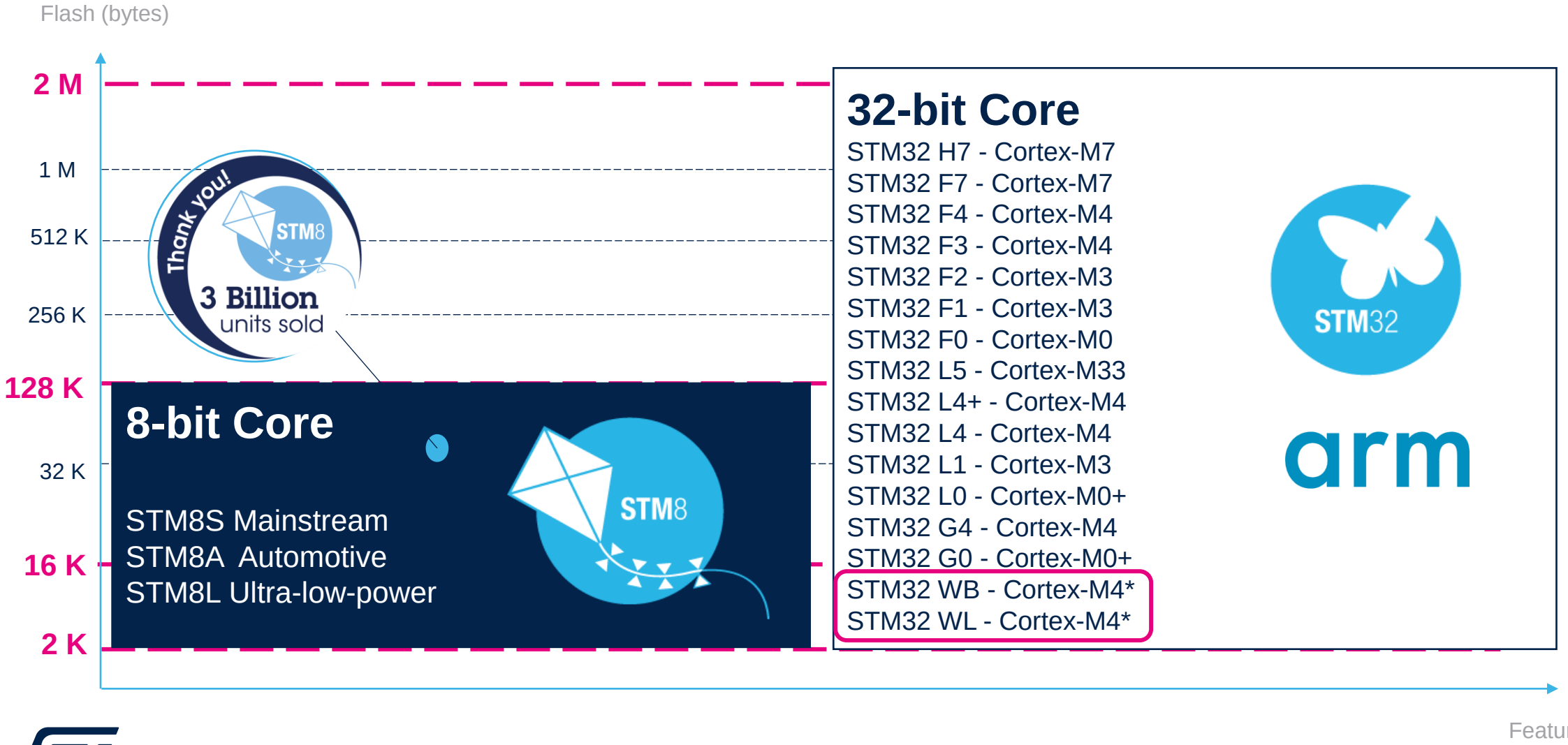
STM32WB development environment

MCUs portfolio TODAY
new families development focus



Note (*) : Cortex-M0+ Radio Co-processor

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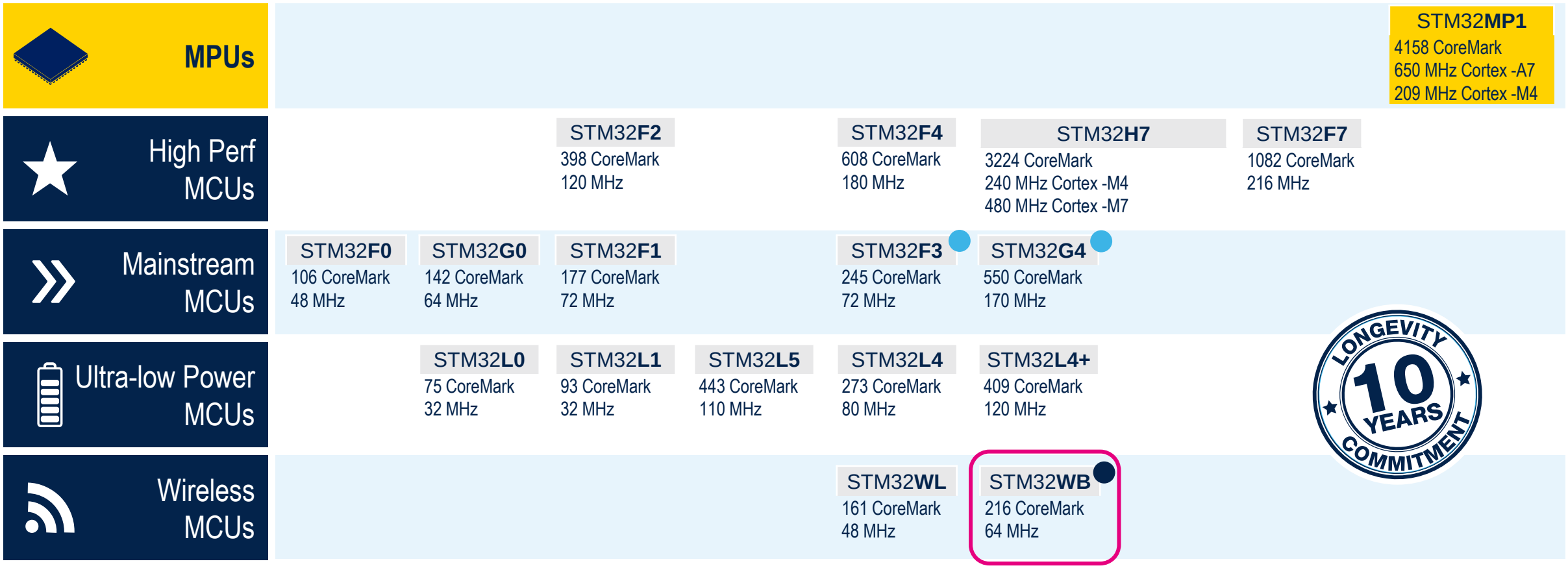
STM32 MCUs and MPUs portfolio



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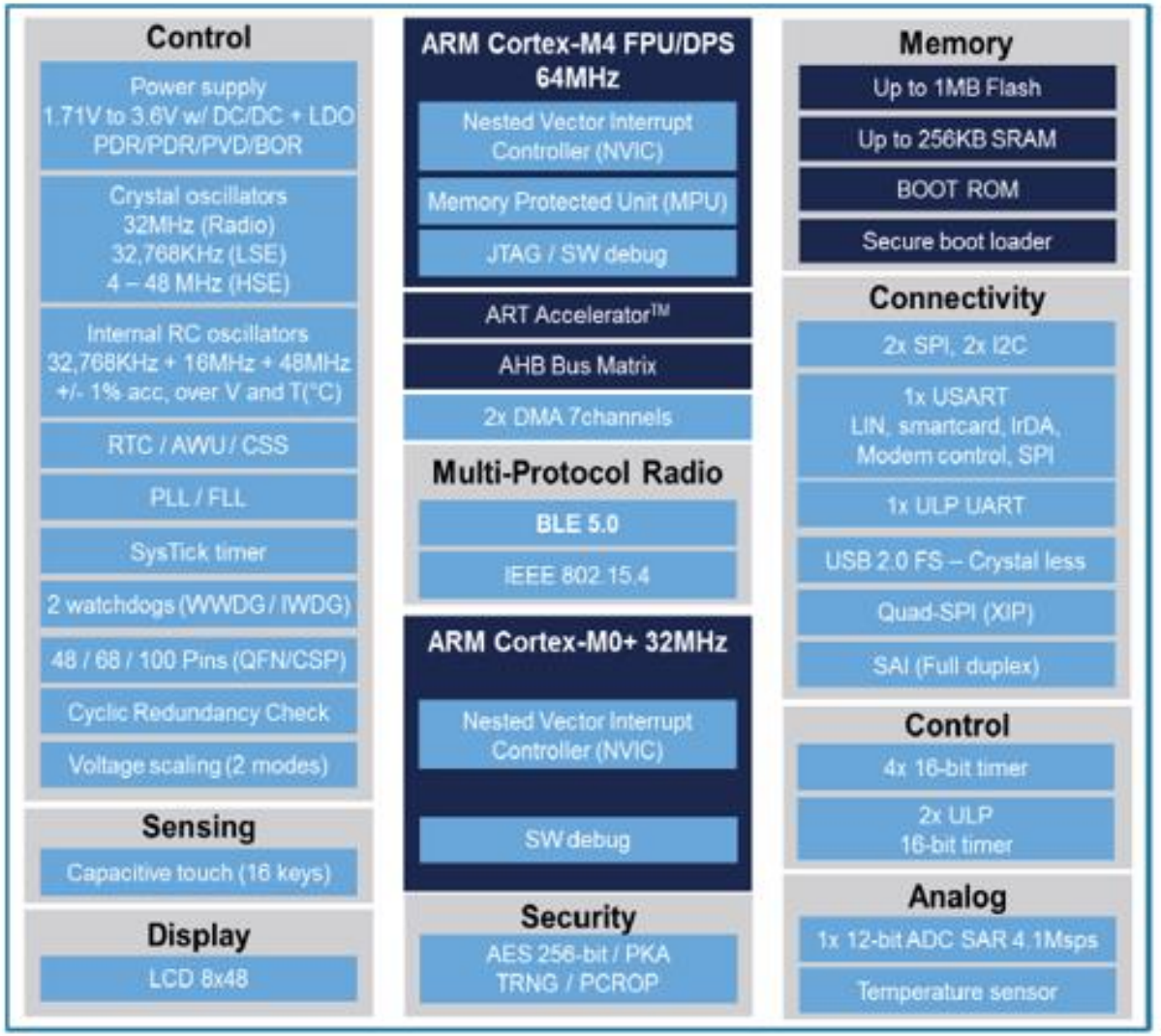
STM32WB55 Block Diagram

- 3 autonomous sub-systems:
  - Cortex-M4
  - Cortex-M0+
  - Radio sub-system
- Voltage range (SMPS, LDO): 1.71 V to 3.6 V
- Temperature range: -40°C to +105°C
- Packages: QFN48, QFN68, WLCSP100



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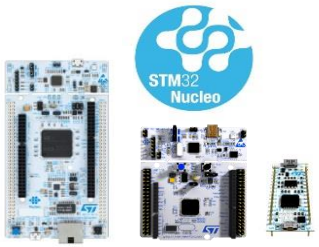
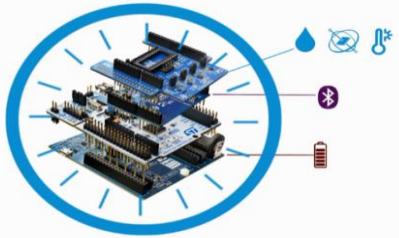
Hardware development tools

Development Tools adapted to your needs





STM32 Nucleo	Discovery kits	Evaluation boards	STM32 Nucleo expansion	Third-party boards
Flexible prototyping	Key feature prototyping	Full feature evaluation	Functionality add-on	From full evaluation to open hardware
www.st.com/stm32nucleo	www.st.com/stm32discovery	www.st.com/stm32evaltools	www.st.com/x-nucleo	

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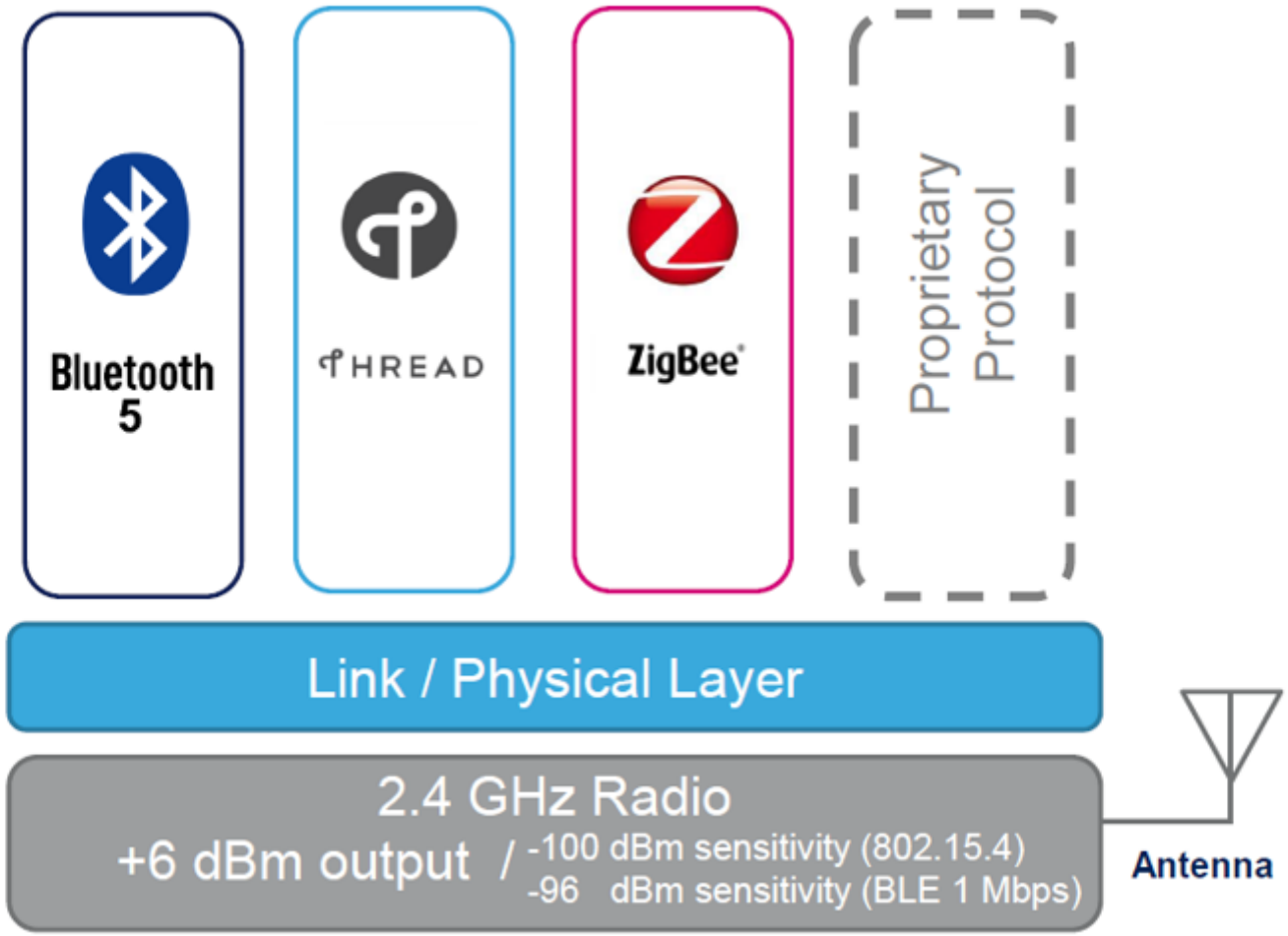
STM32WB dev kit bundle

- P-NUCLEO-WB55

KEY FEATURES

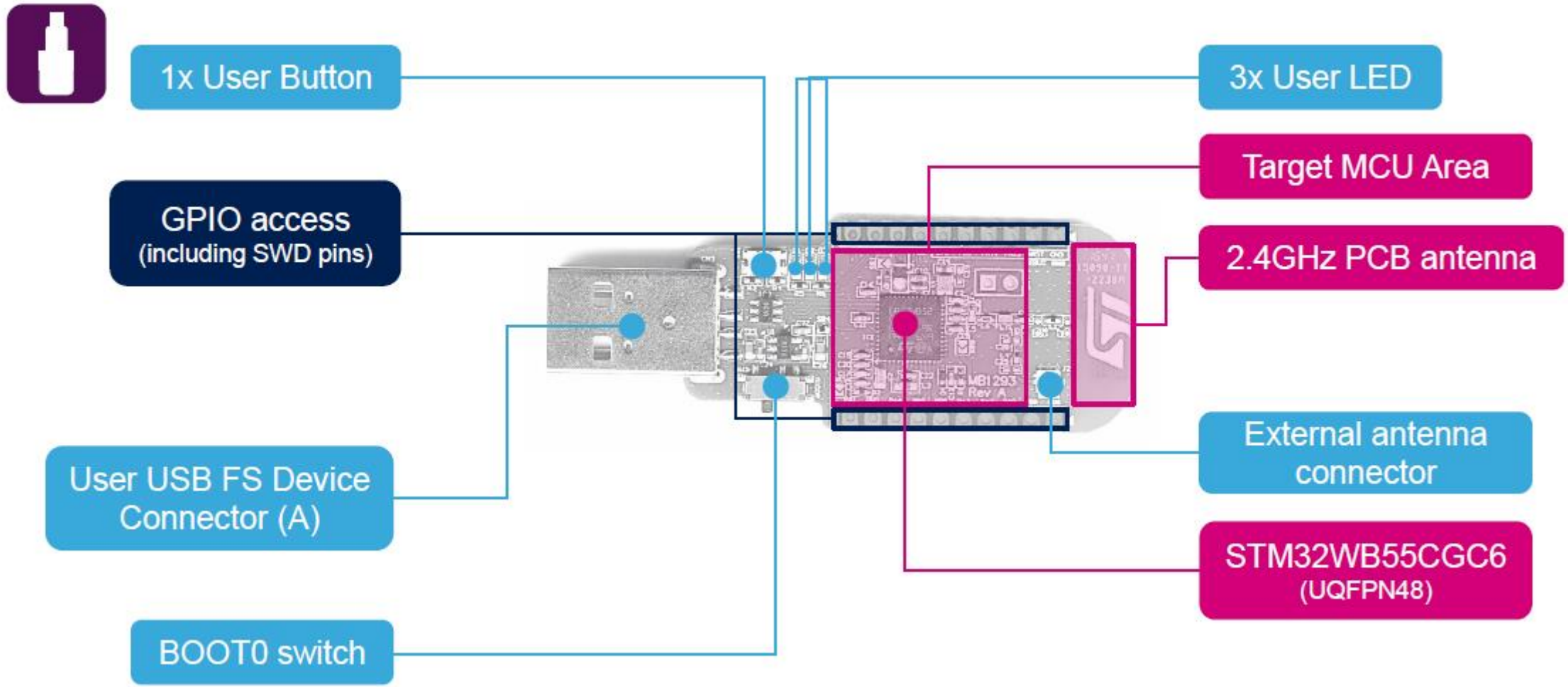
- Nucleo68
  - STM32WB microcontroller in a VFQFPN68 package
  - 2.4 GHz RF transceiver supporting Bluetooth® specification v5.0 and IEEE 802.15.4-2011 PHY and MAC
  - Dedicated Arm® 32-bit Cortex® M0+ CPU for real-time Radio layer
  - Three user LEDs
  - Three user buttons and one reset button
  - Board connector: USB user with Micro-B
  - Board expansion connectors:
    - Arduino™ Uno V3
    - ST morpho
  - Integrated PCB antenna or footprint for SMA connector
  - Flexible power-supply options: ST-LINK USB VBUS or external sources
  - On-board socket for CR2032 battery
  - On-board ST-LINK/V2-1 debugger/programmer with USB re- enumeration capability: mass storage, virtual COM port and debug port
  - Comprehensive free software libraries and examples available with the STM32Cube Expansion Package
  - Support of a wide choice of Integrated Development Environments (IDEs), including IAR™, Keil®, GCC-based IDEs, Arm® Mbed™
- USB dongle
  - STM32WB microcontroller in UFQFPN48 package
  - 2.4 GHz RF transceiver supporting Bluetooth® specification v5.0 and IEEE 802.15.4-2011 PHY and MAC
  - Dedicated Arm® 32-bit Cortex® M0+ CPU for real-time Radio layer
  - Switch for boot management
  - User push button
  - Three user LEDs
  - Integrated PCB antenna or UFL connector

Wireless part – make it Yours

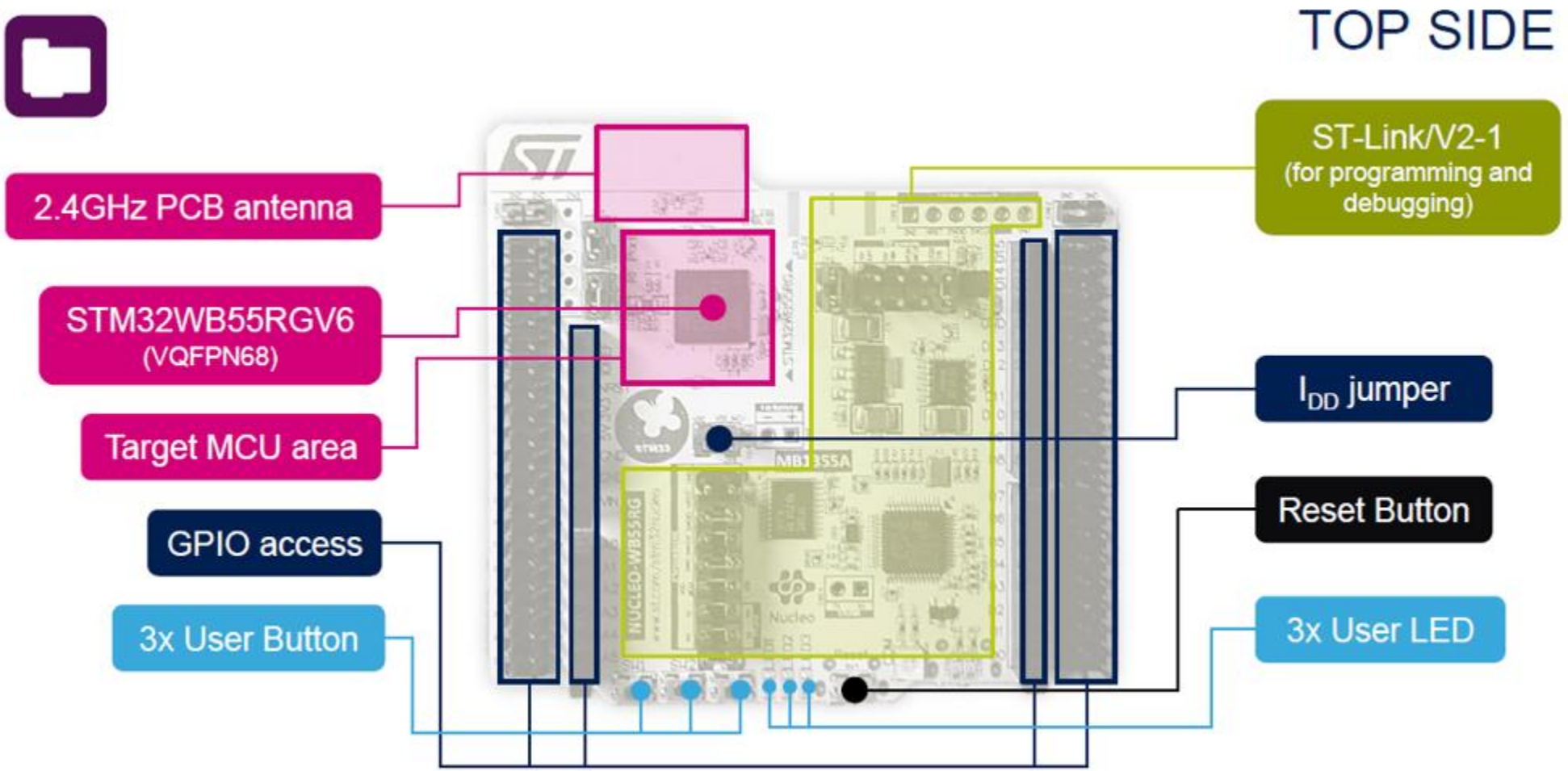


STM32WB dev kit bundle

STM32WB USB dongle

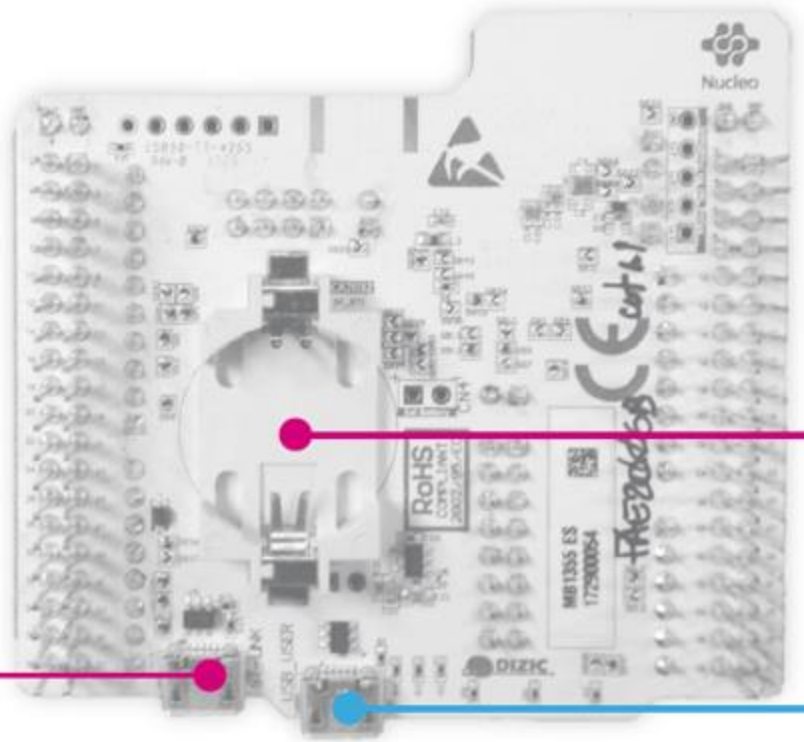


STM32WB Nucleo Kit



STM32WB Nucleo Kit

BOTTOM SIDE



ST-Link USB Connector (micro)

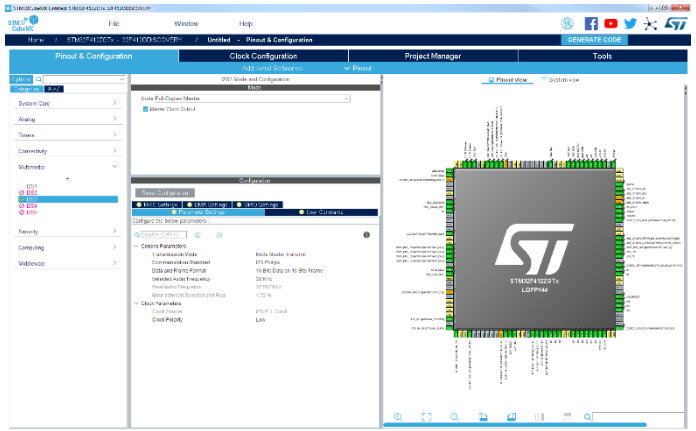
CR2032 socket

User USB FS Device connector (micro)

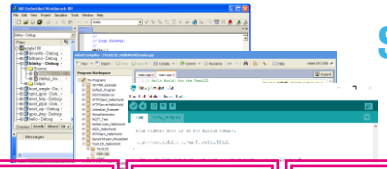
STM32 software tools portfolio

A C/C++ flow in three steps

STM32 CubeMX



FREE IDEs



STM32 CubeIDE

IAR SYSTEMS · arm KEIL · ac6 Assistance Conseil Systemes · atollic · ARDUINO

arm MBED · TASKING AN ALTIUM BRAND · SEGGER · RAISONANCE · SysPROGS · iSYSTEM · EMPROG "Where Software Meets Hardware"

STM32 CubeMonitor

STM32 CubeProgrammer

STM32CubeMX, GUI Builders
Configure & Generate Code

ST and Partner IDEs
Compile and Debug

STM32CubeProg/Monitor
Monitor, Program & Utilities

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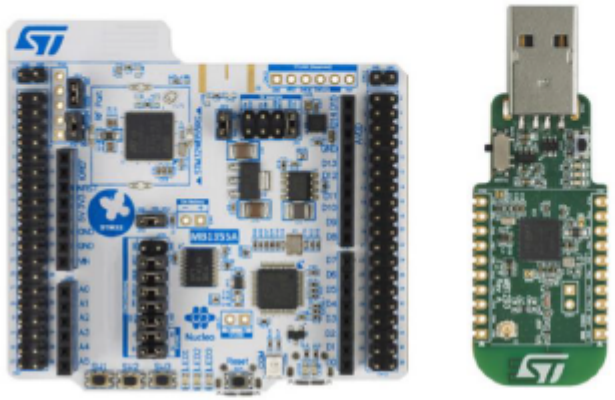
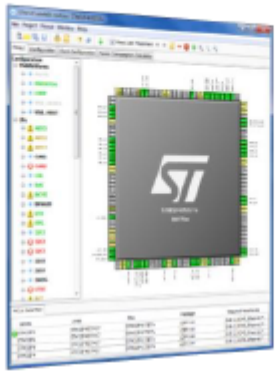
Prototyping made as easy as 1,2,3



Hardware
Evaluation Pack

STM32 WB



STM32 CubeMonitor-RF

STM32CubeMX
Code generation
Power calculation
STM32CubeMonRF

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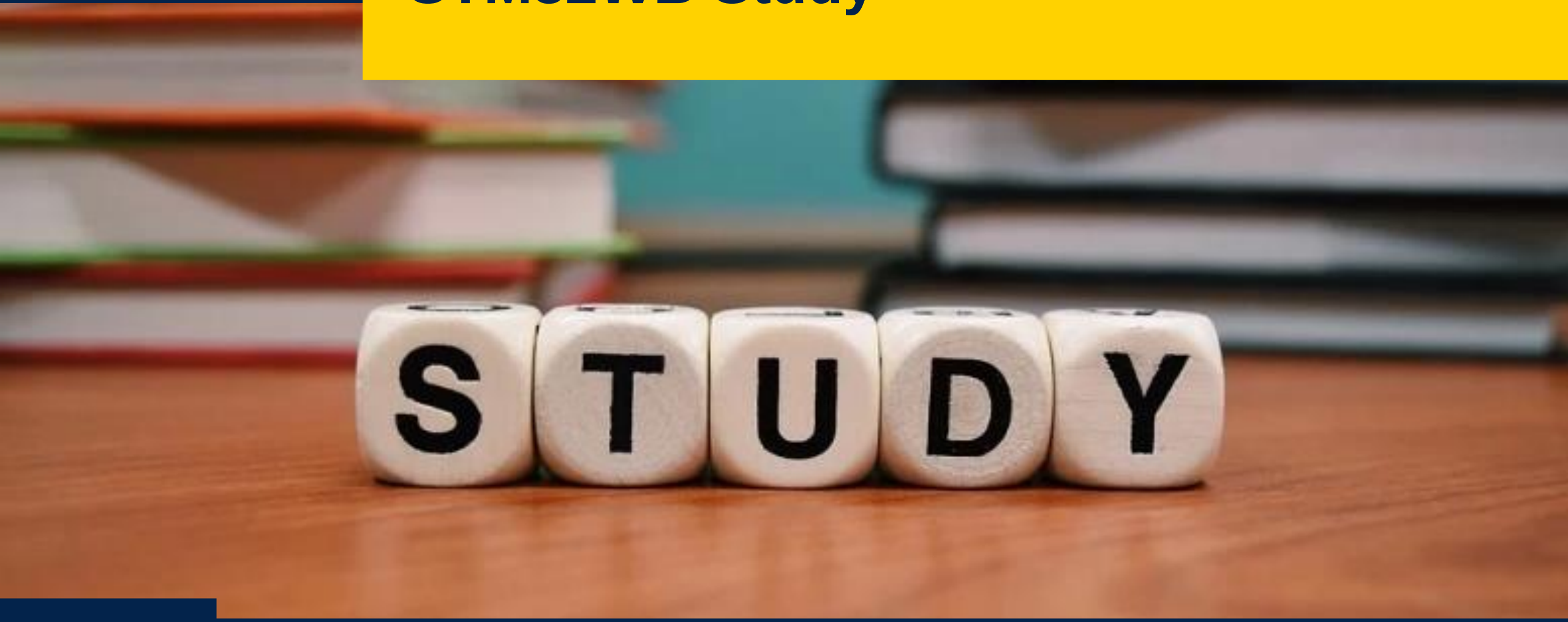
STM32WB Study



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How to study STM32WB?

- STM32WB Workshop MOOC (Massive Open Online Course)

STM32WB Firmware Update Over the Air (FUOTA)

STM32WB Networking – BLE MESH

STM32WB RF guidelines

STM32WB workshop

STM32 goes wireless: BLE IoT for all!

Ultra-low-power dual-core SoC with multi-protocol radio and superb protection powers next-gen smart connected objects

Access the course

STM32 goes wireless: BLE IoT for all!

Ultra-low-power dual-core SoC with multi-protocol radio and superb protection powers next-gen smart connected objects

Access the course

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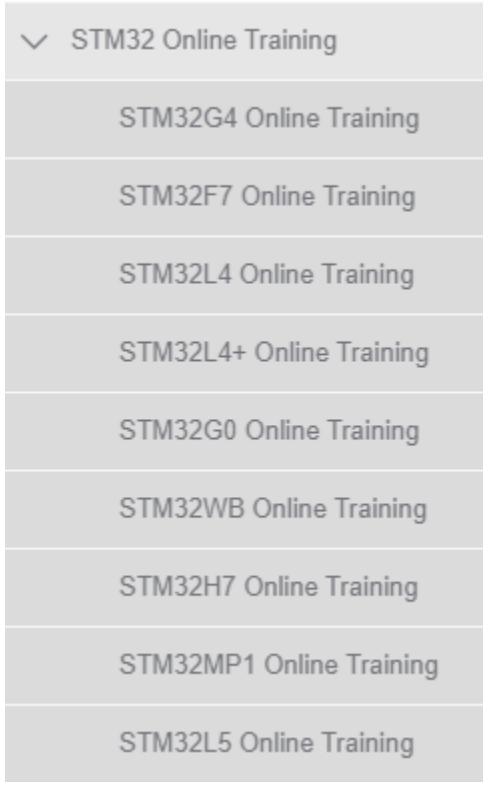
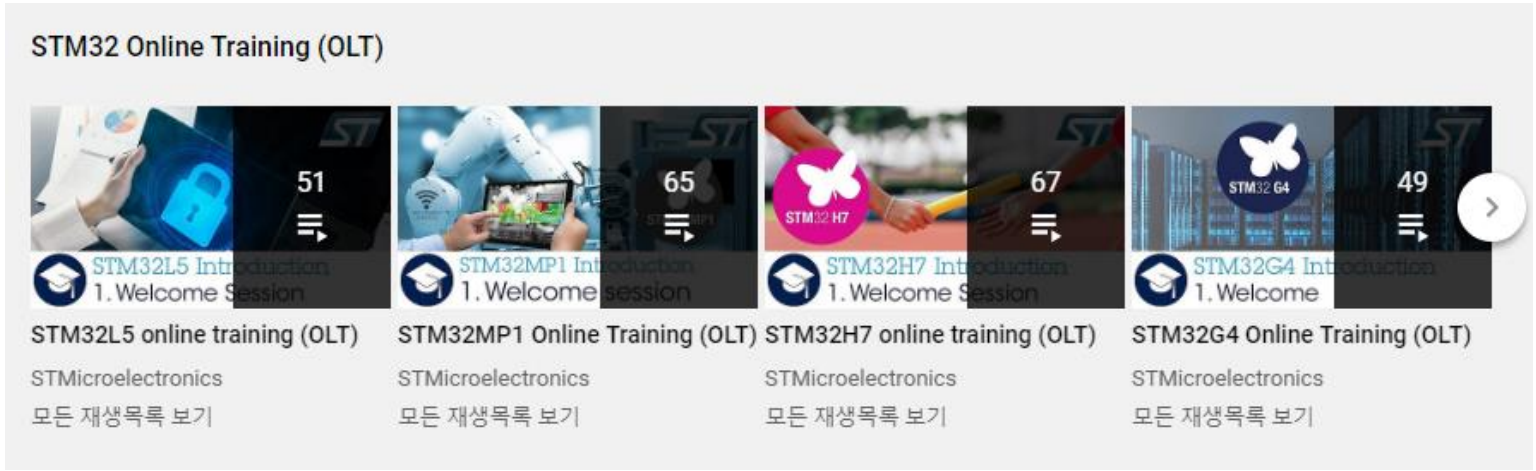
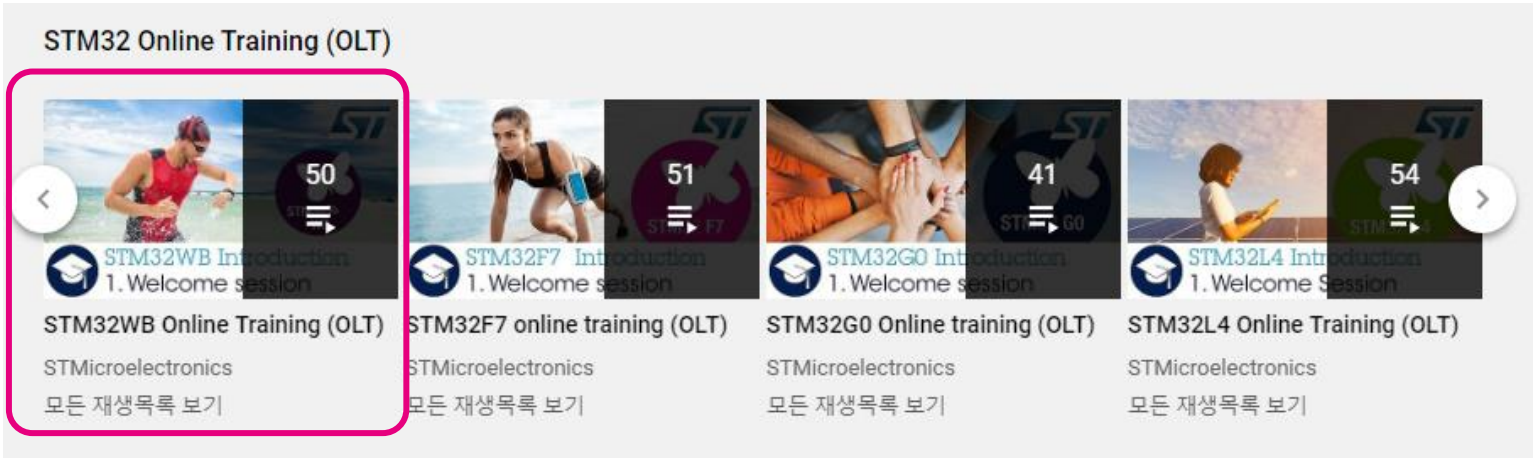
How to study STM32WB?

- STM32 Online Training (OLT)







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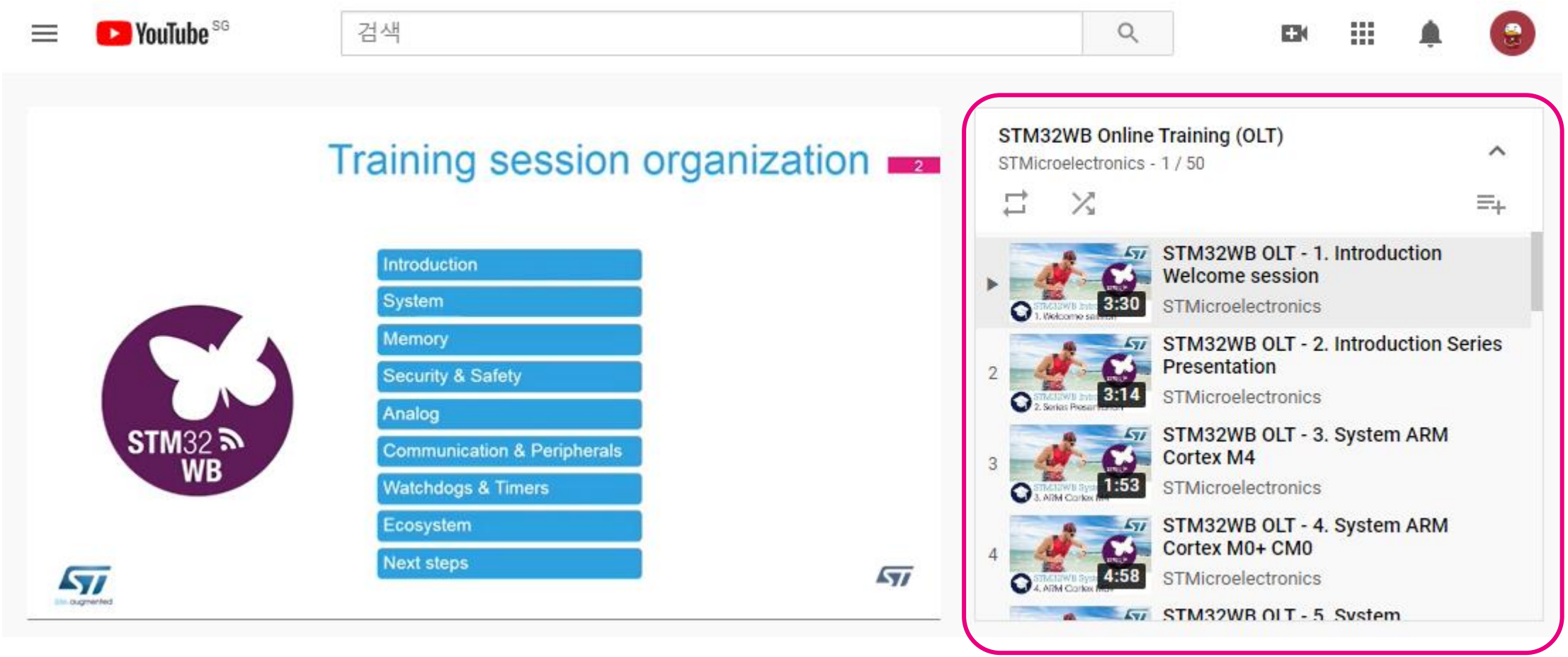
How to study STM32WB?

- STM32 Online Training (OLT)



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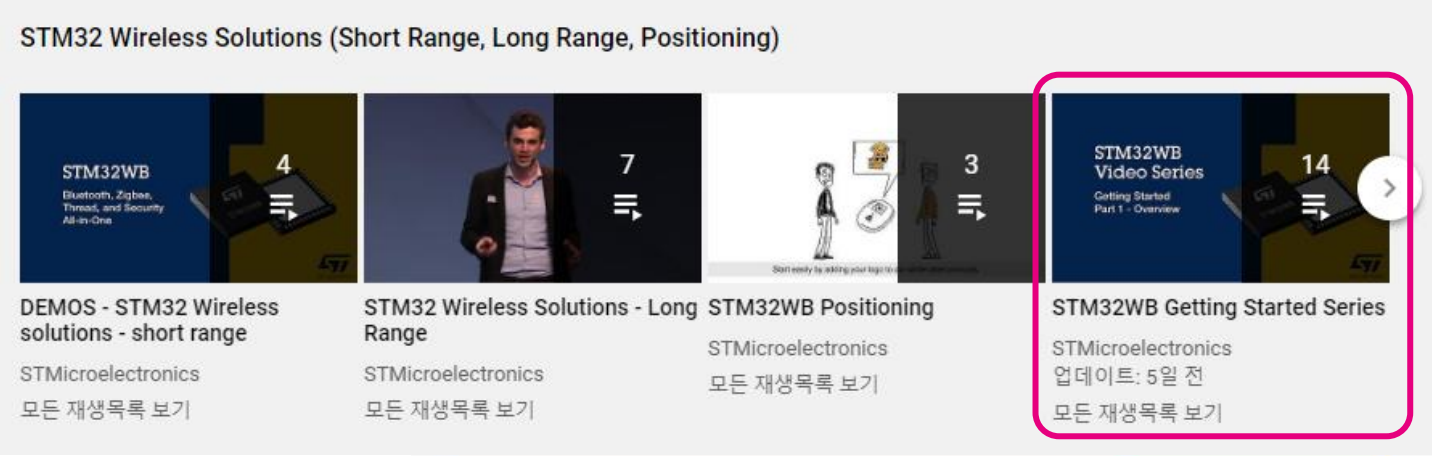
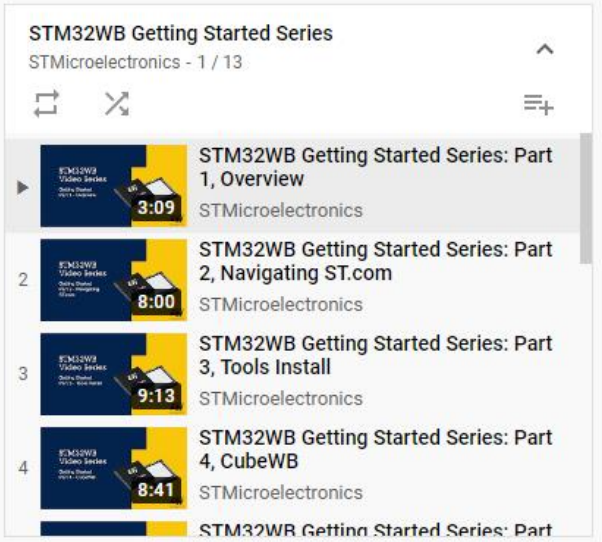
How to study STM32WB?

- STM32 Wireless Solutions (Short Range, Long Range, Positioning)





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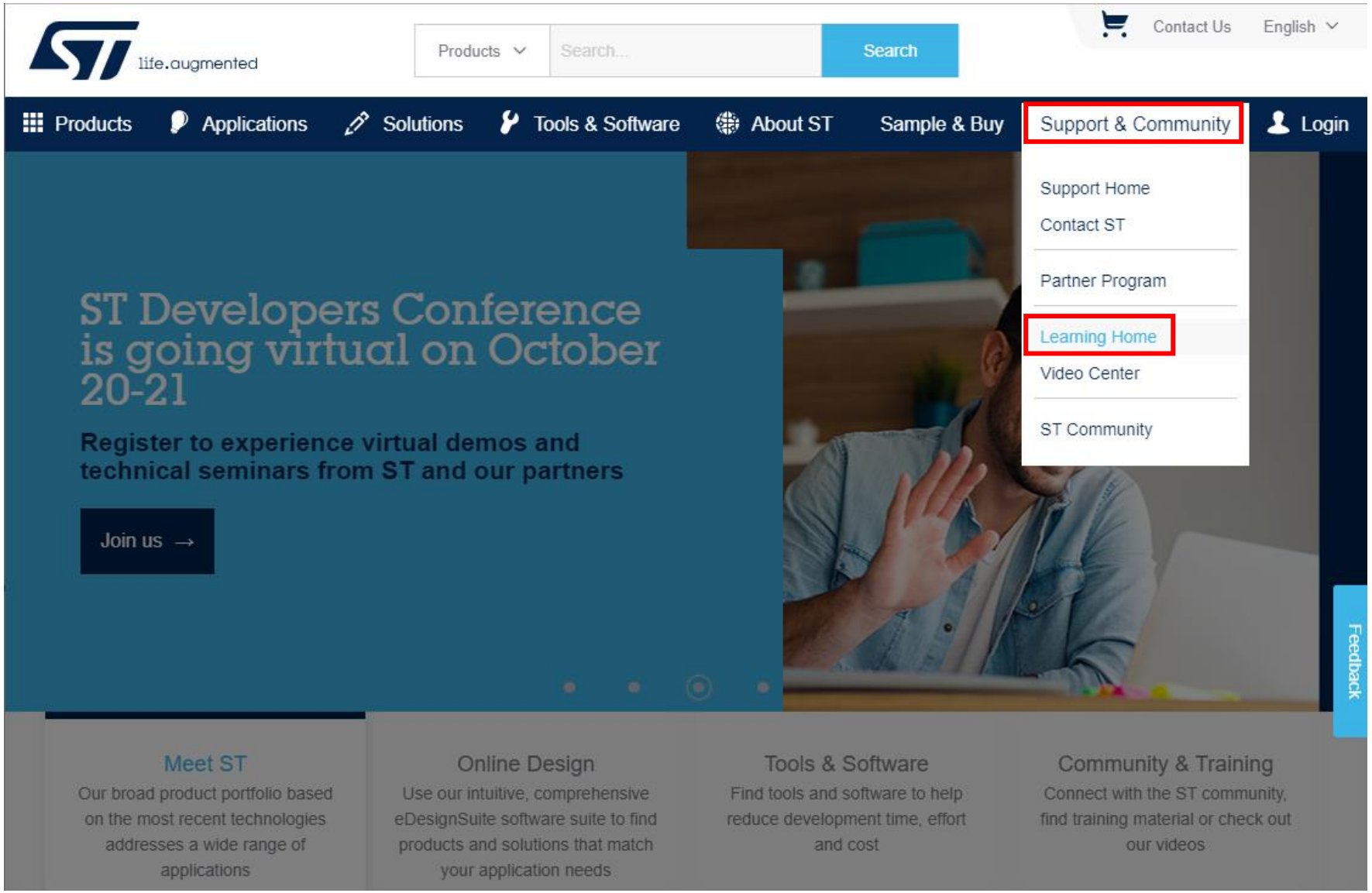
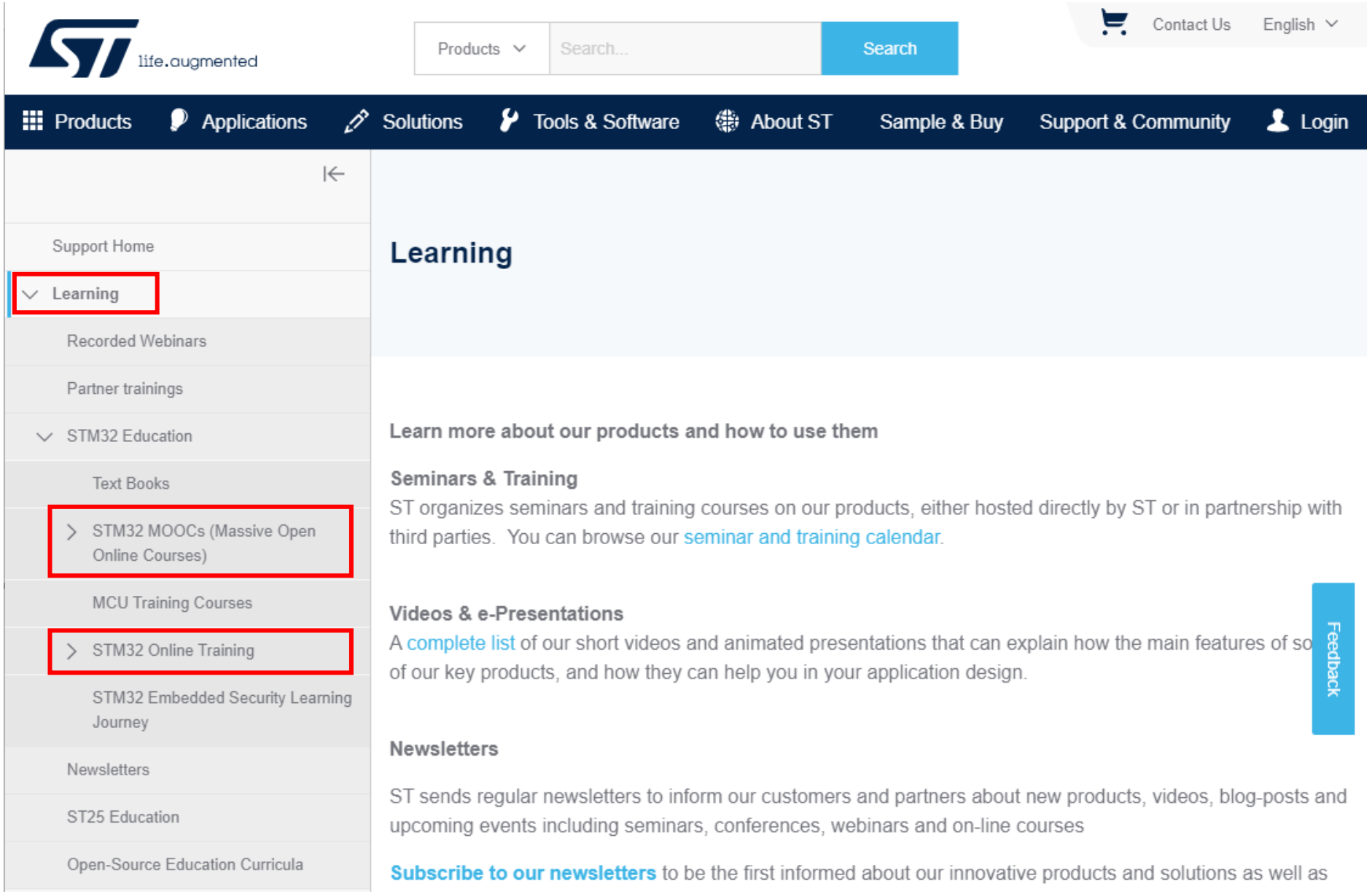
ST Learning Home



STM32WB Learning



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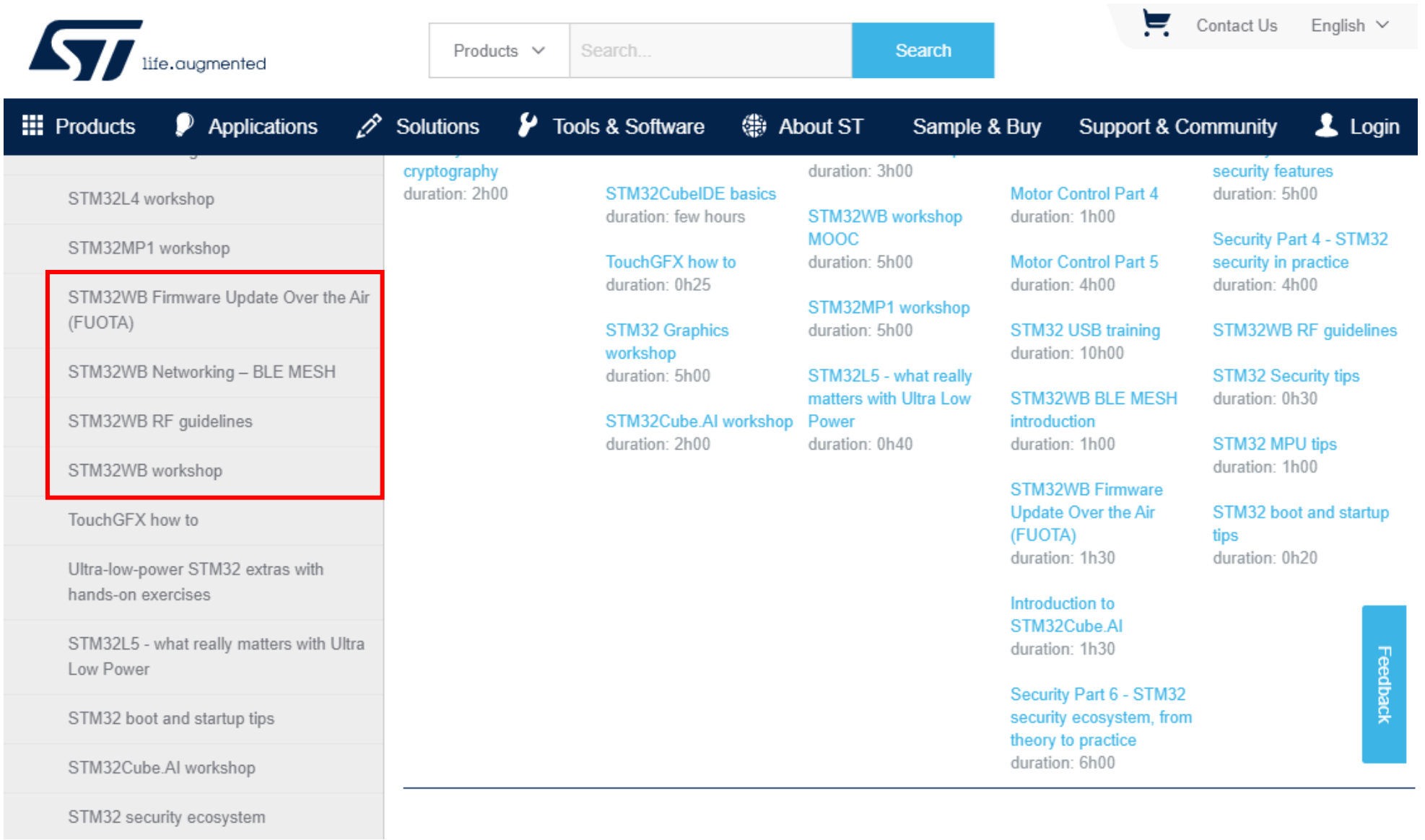
STM32 MOOCs (Massive Open Online Courses)



STM32WB workshop MOOC

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(Massive Open Online Courses)

- Basics of cryptography
- External QSPI loader how to
- FreeRTOS on STM32 training
- Graphics with STM32
- Introduction to security
- Introduction to STM32Cube.AI
- Introduction to STM32L0 family
- LPWAN workshop
- Motor Control - Part 1
- Motor Control - Part 2
- Motor Control - Part 3
- Motor Control - Part 4
- Motor Control - Part 5
- Moving from 8 to 32 bits workshop
- STM32 drives Spirit2
- STM32 Graphics Workshop

STM32WB workshop MOOC

STM32 goes wireless: BLE IoT for all!

Ultra-low-power dual-core SoC with multi-protocol radio and superb protection powers next-gen smart connected objects

Access the course

This MOOC provides basic information about STM32WB MCU line, with its hardware and software tools introduction and multiple hands-on session. Within the course, there is an introduction to BLE theory and its implementation within STM32WB stack.

What is the STM32WB?

The STM32WB55xx multi-protocol wireless and ultra-low-power devices embed a powerful and ultra-low-power radio compliant with the Bluetooth® Low Energy SIG specification v5.0 and with IEEE 802.15.4-2011. They contain a dedicated Arm® Cortex® -M0+ for performing all the real-time low layer operation.

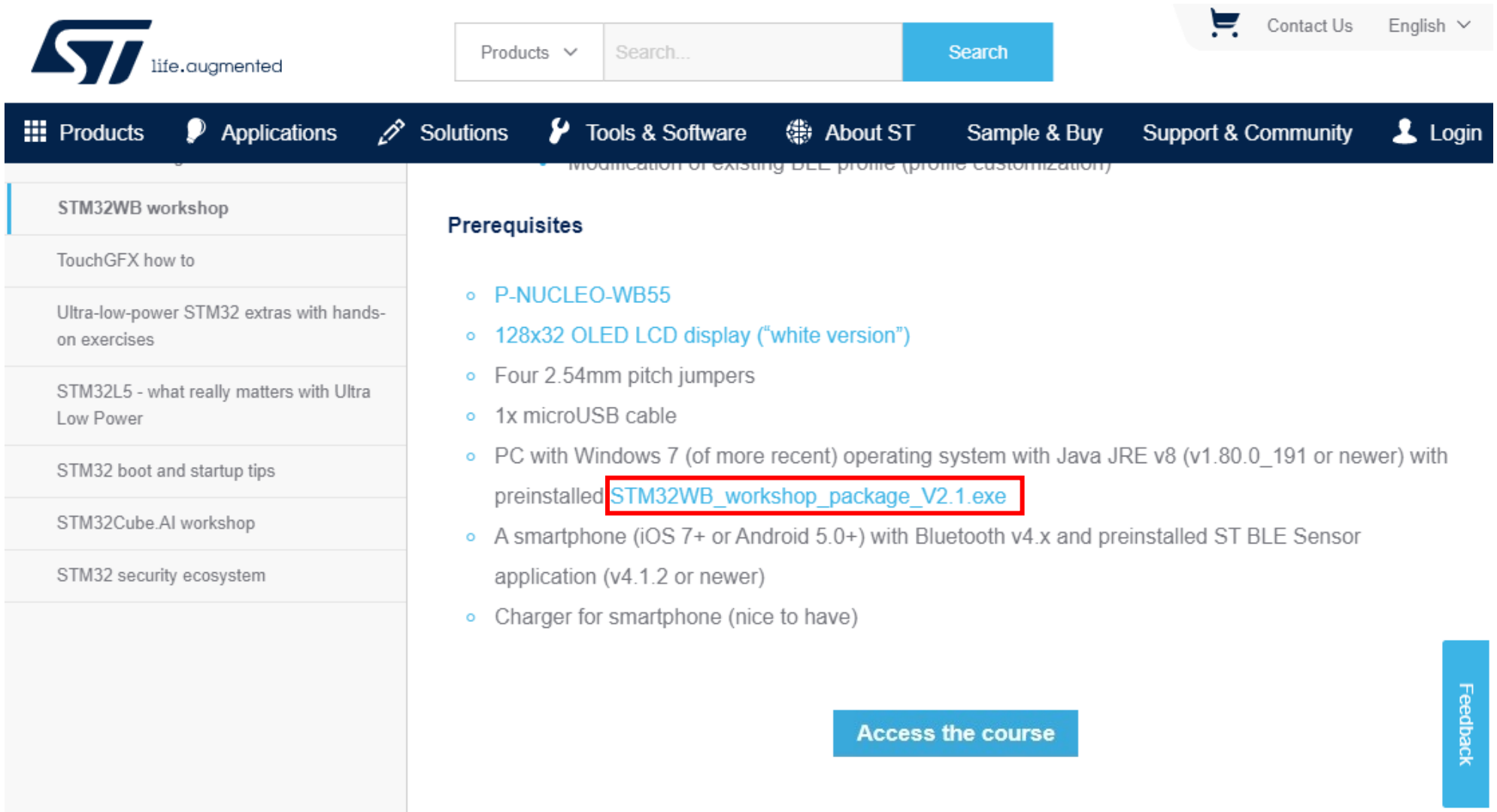
The STM32WB55xx constitute a family of microcontrollers with different memory sizes, packages and peripherals.

Who should attend this course?

- Engineers looking for more information about our STM32WB microcontrollers
- Engineers interested in BLE network creation with STM32WB devices
- Engineers looking to design applications using a user-friendly development ecosystem

Feedback

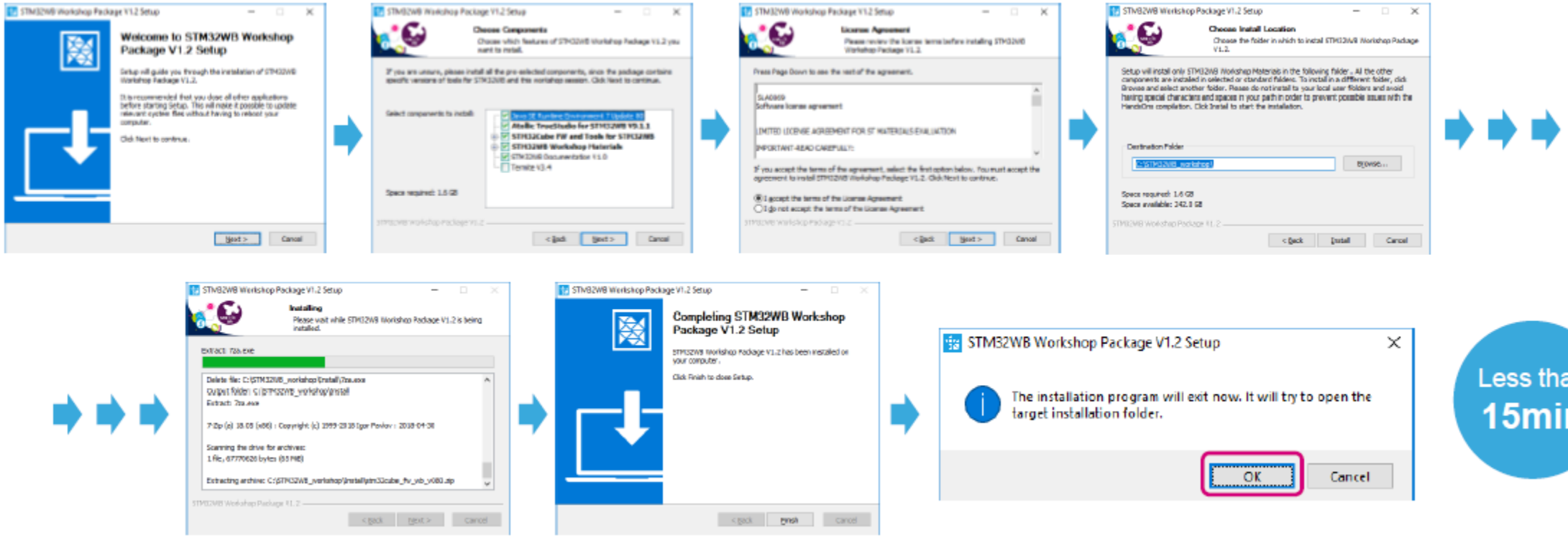
STM32WB workshop MOOC



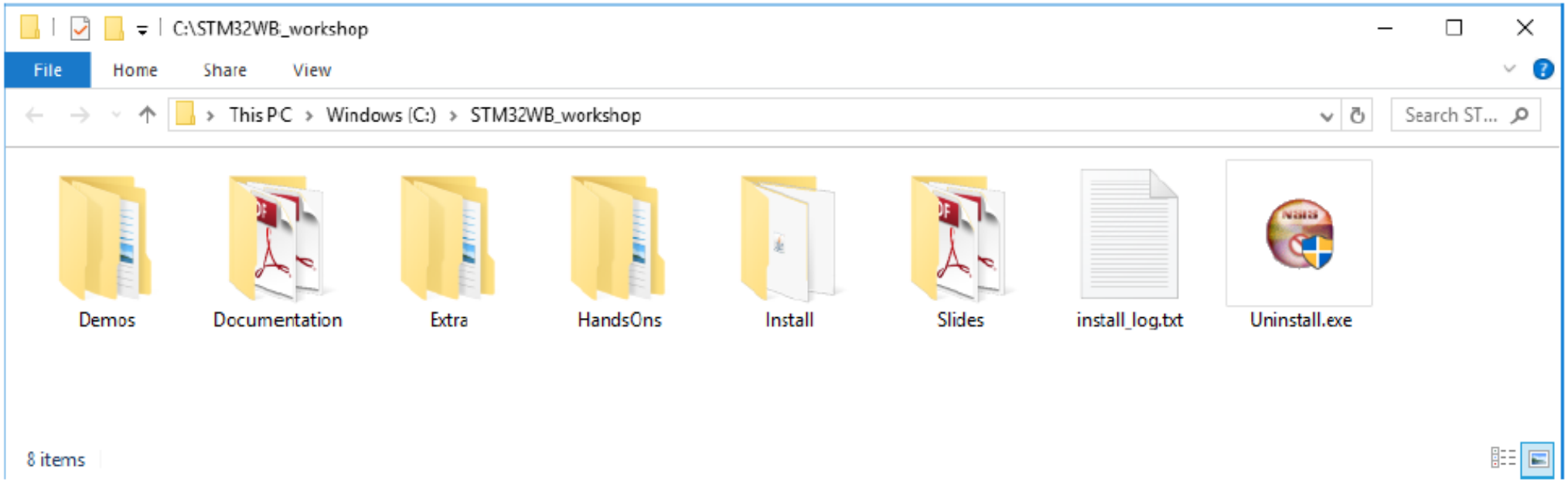
Prerequisites

- Have run the STM32WB_workshop_package_V2.1.exe (Package) to install :
  - Atollic TrueStudio v9.3.0
  - STM32CubeMX V5.1.0
  - STM32CubeWB HAL v1.0.0
  - STM32CubeProg v2.0.0
  - STM32CubeMonitor-RF v2.3.0
  - Documentation related to STM32WB
  - Hands-On projects and files
  - Slides for all chapters (PDF format)
  - Termite (simple PC terminal app))

Install the STM32WB Workshop Package



STM32WB Workshop Materials



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HandsOns	2020-10-06 오후 4:...	File folder	
Install	2020-10-06 오후 4:...	File folder	
Slides	2020-10-06 오후 4:...	File folder	
install_log.txt	2020-10-06 오후 4:...	Text Document	1 KB
Uninstall.exe	2020-10-06 오후 4:...	Application	55 KB

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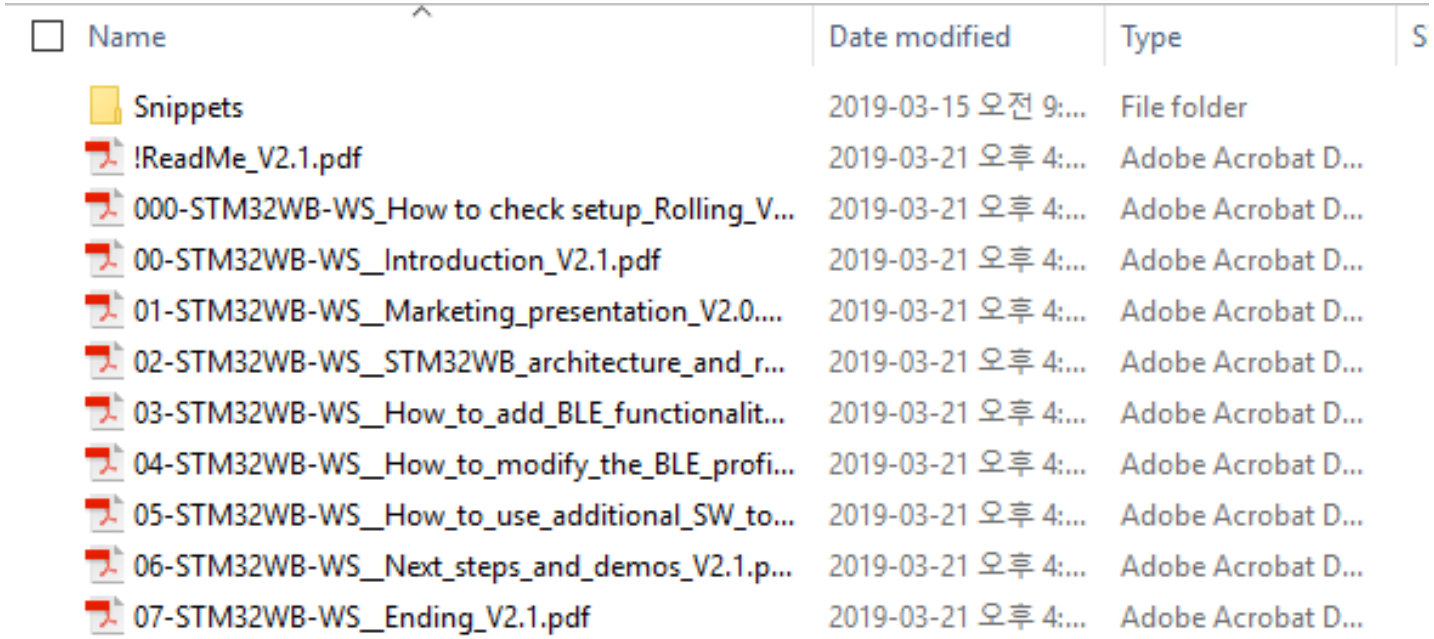
STM32WB Workshop Slides



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01-STM32WB-WS__Marketing_presentation_V2.0....	2019-03-21 오후 4:...	Adobe Acrobat D...	
02-STM32WB-WS__STM32WB_architecture_and_r...	2019-03-21 오후 4:...	Adobe Acrobat D...	
03-STM32WB-WS__How_to_add_BLE_functionalit...	2019-03-21 오후 4:...	Adobe Acrobat D...	
04-STM32WB-WS__How_to_modify_the_BLE_profi...	2019-03-21 오후 4:...	Adobe Acrobat D...	
05-STM32WB-WS__How_to_use_additional_SW_to...	2019-03-21 오후 4:...	Adobe Acrobat D...	
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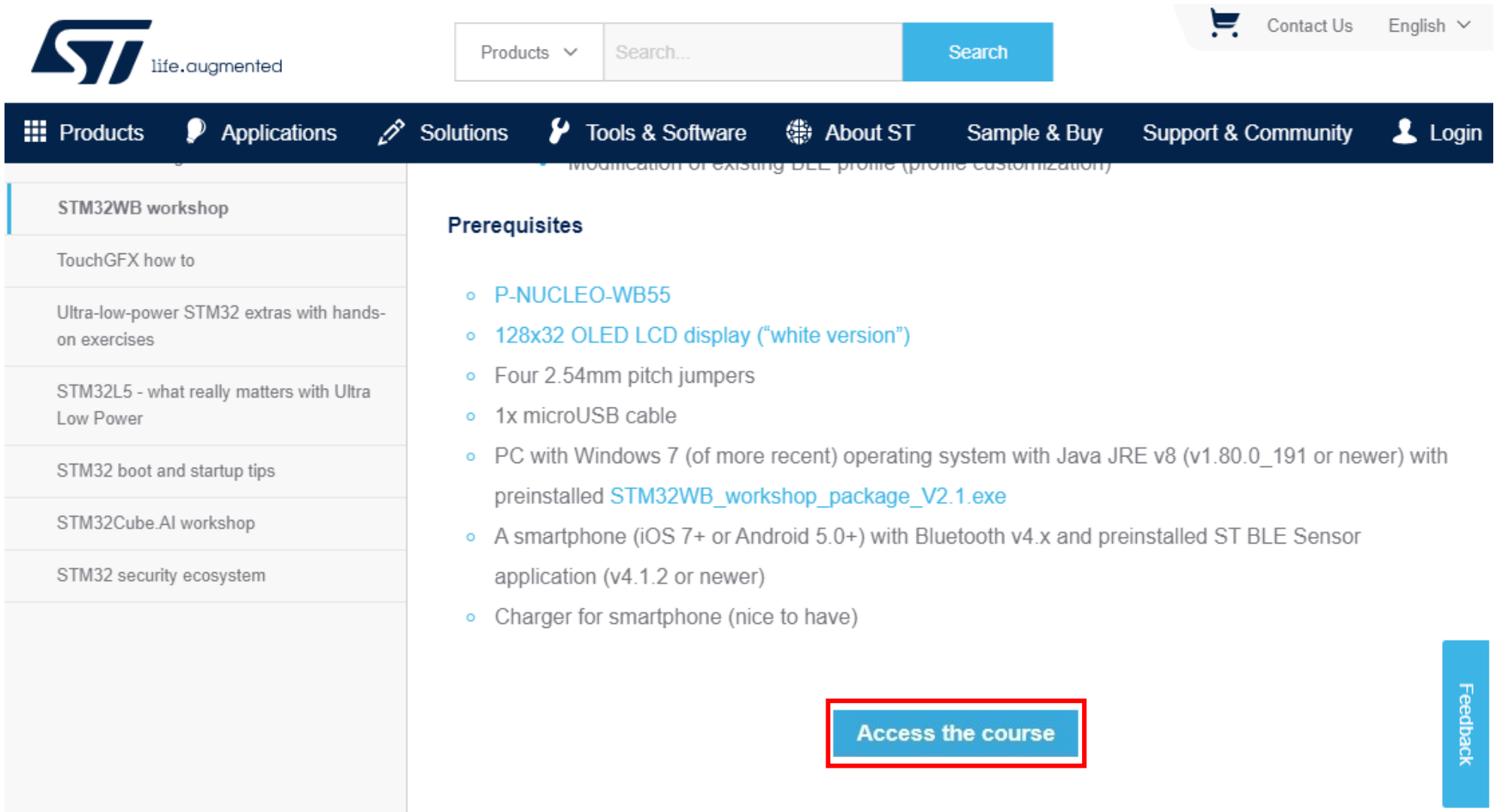
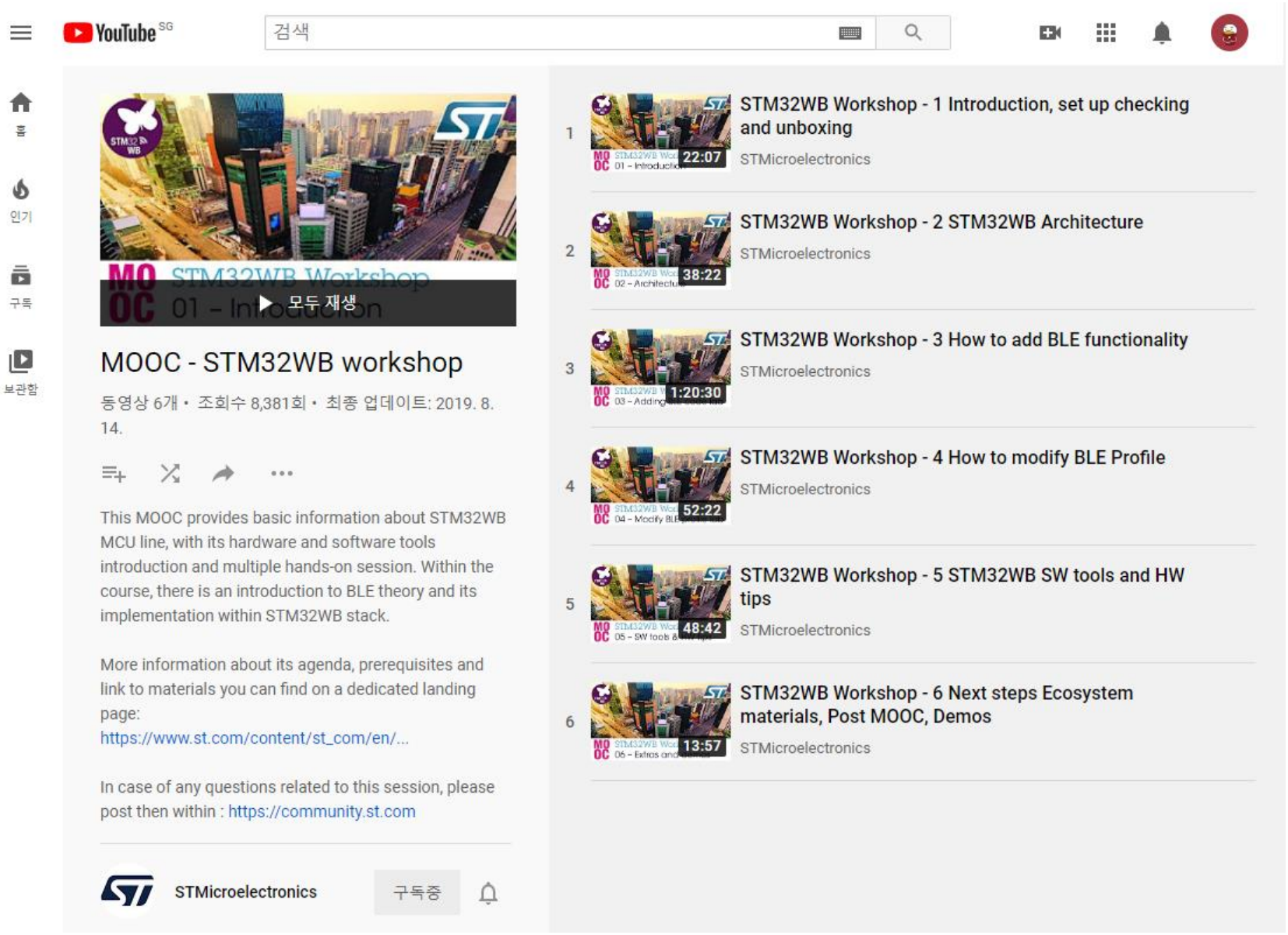
STM32WB workshop MOOC



MOOC - STM32WB workshop



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STM32WB FUOTA MOOC

STM32WB Firmware Update Over the Air (FUOTA)

STM32 goes wireless: BLE IoT for all!

Ultra-low-power dual-core SoC with multi-protocol radio and superb protection powers next-gen smart connected objects

Access the course

This MOOC demonstrates how to update STM32WB code using different tools and techniques.

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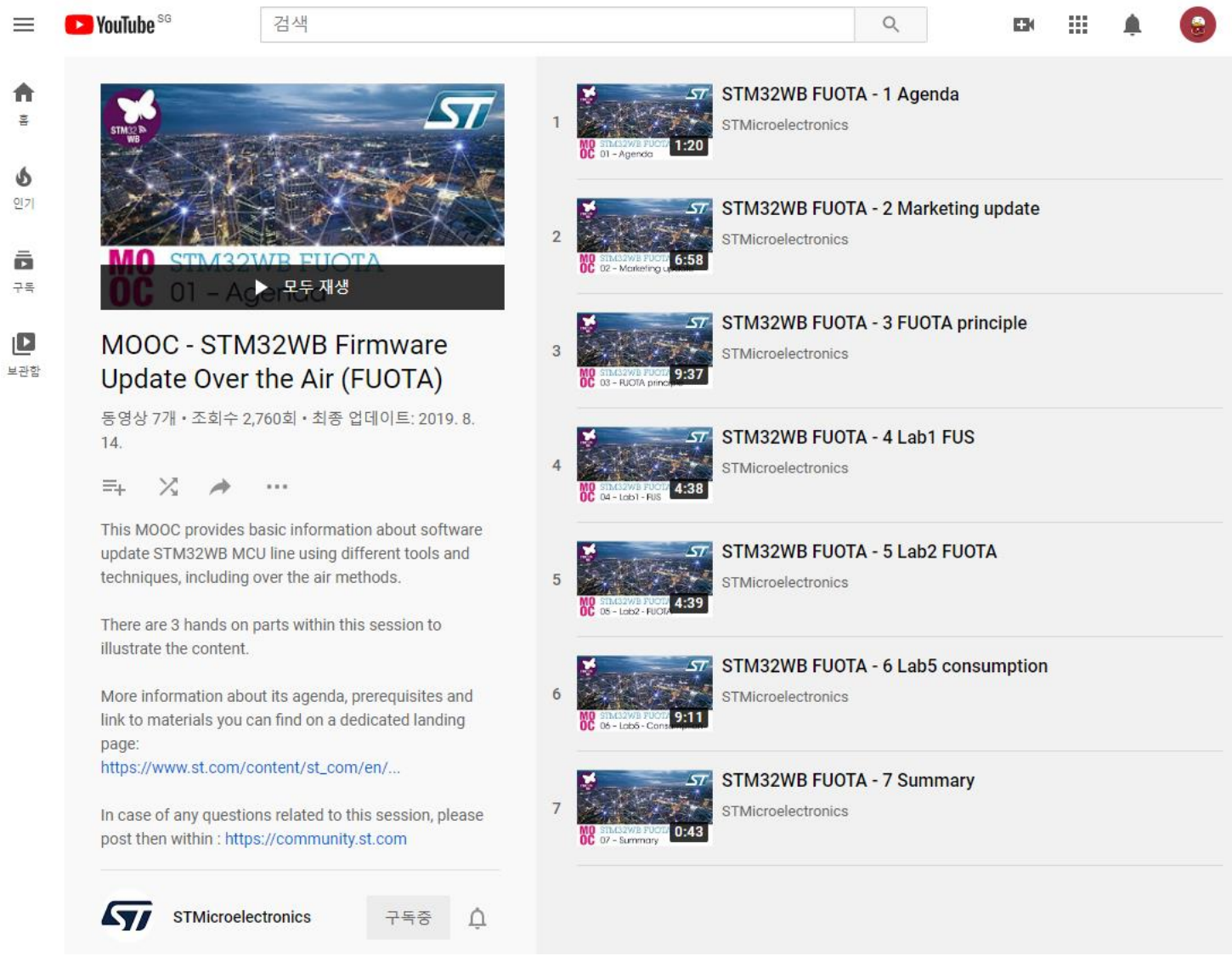
STM32WB FUOTA MOOC



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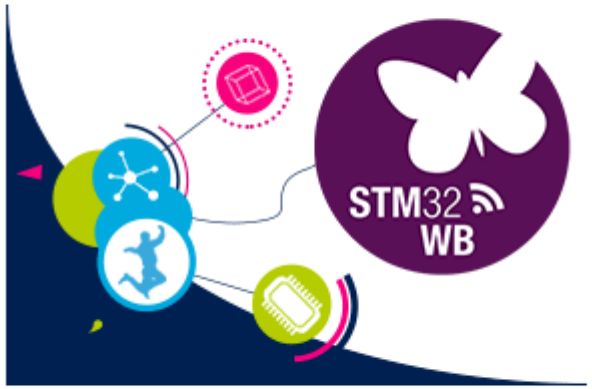
STM32WB BLE MESH MOOC

STM32WB Networking – BLE MESH MOOC



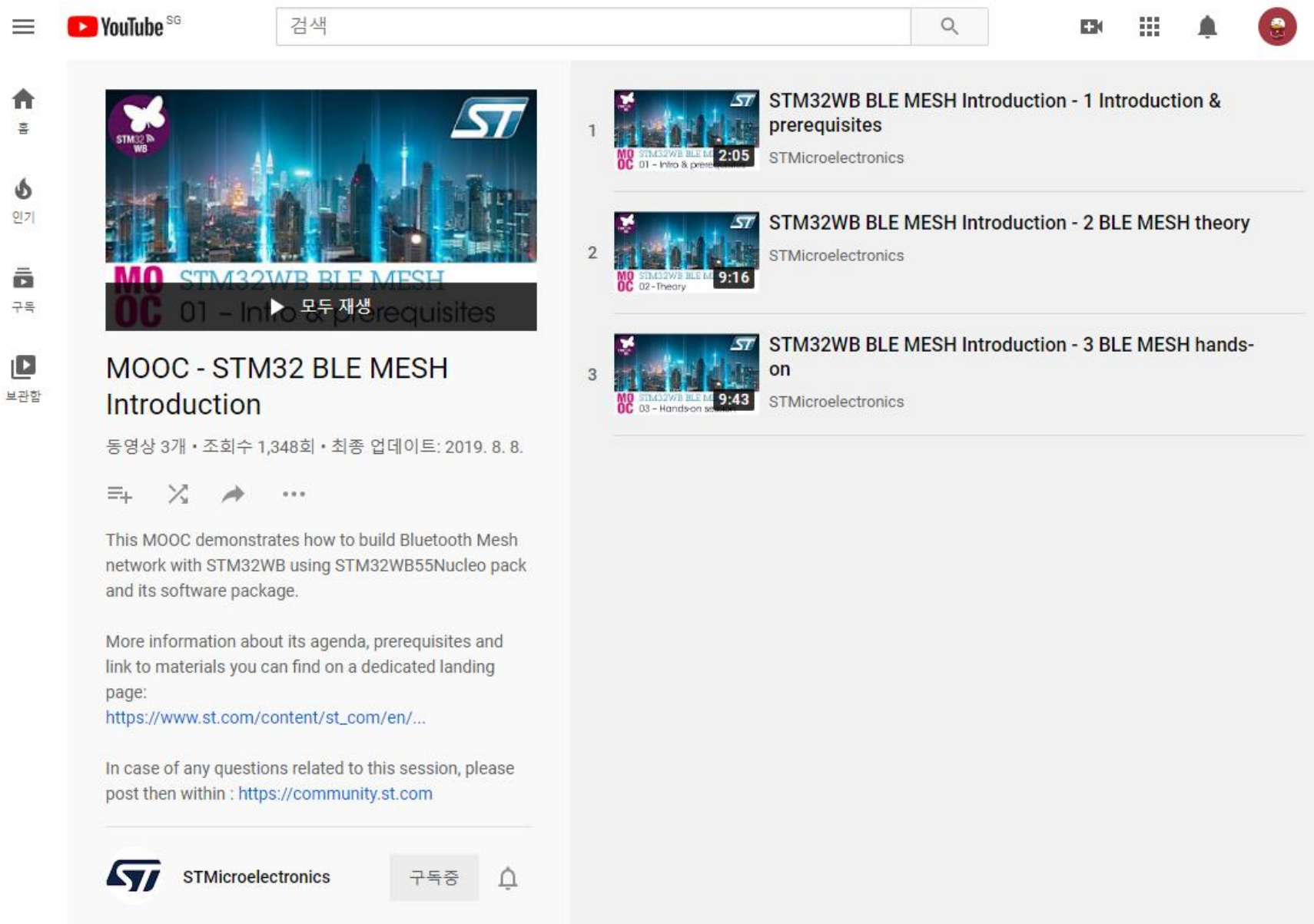
STM32 goes wireless: BLE IoT for all!

Ultra-low-power dual-core SoC with multi-protocol radio and superb protection powers next-gen smart connected objects

Access the course

This MOOC demonstrates how to build Bluetooth Mesh network with STM32WB using STM32WB55Nucleo pack and its software package.

STM32WB BLE MESH MOOC



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STM32WB RF Guidelines MOOC

STM32WB – RF guidelines MOOC

STM32WB – RF guidelines

Learn how to design your RF circuit within STM32WB based application

Access the course

Highlighting important knowledge for correct RF design of application. Evaluation of meaning of the individual components in RF chain and simplifying it enough understood for beginners in this specific RF area.

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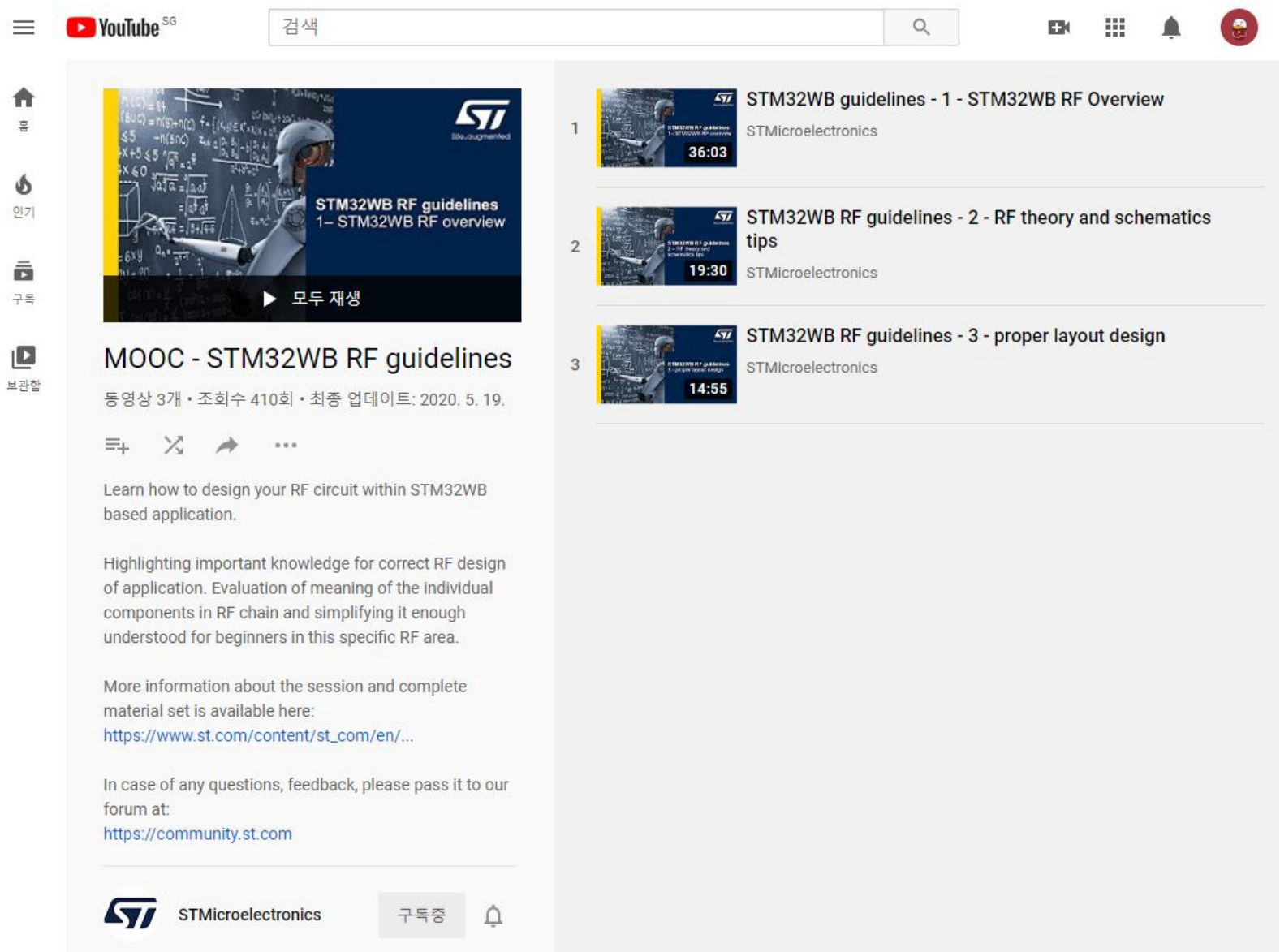
STM32WB RF Guidelines MOOC



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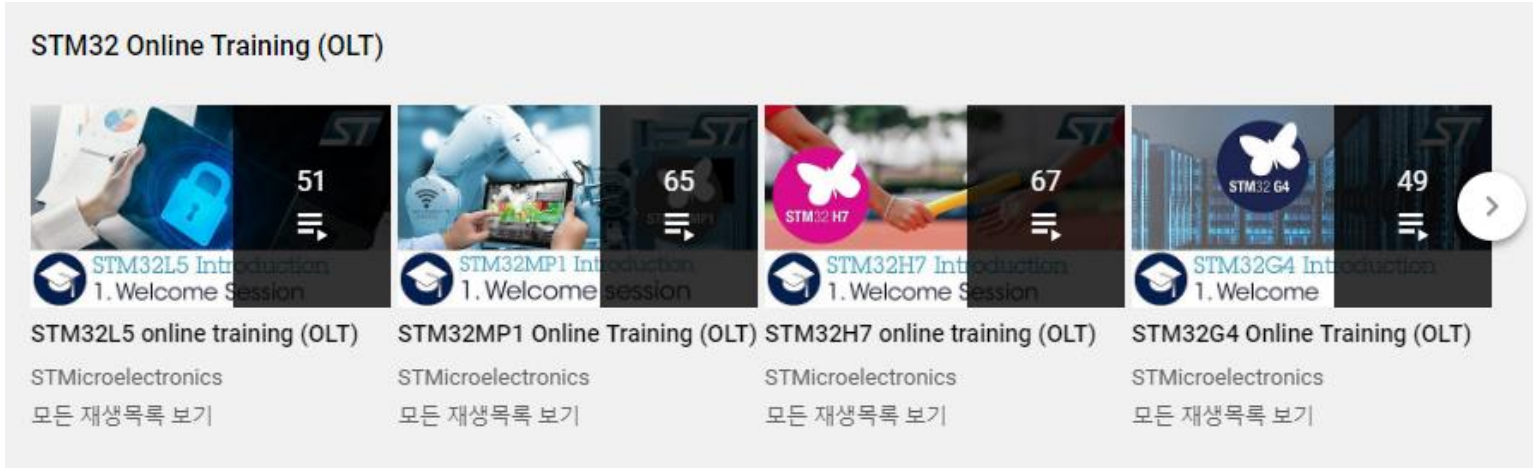
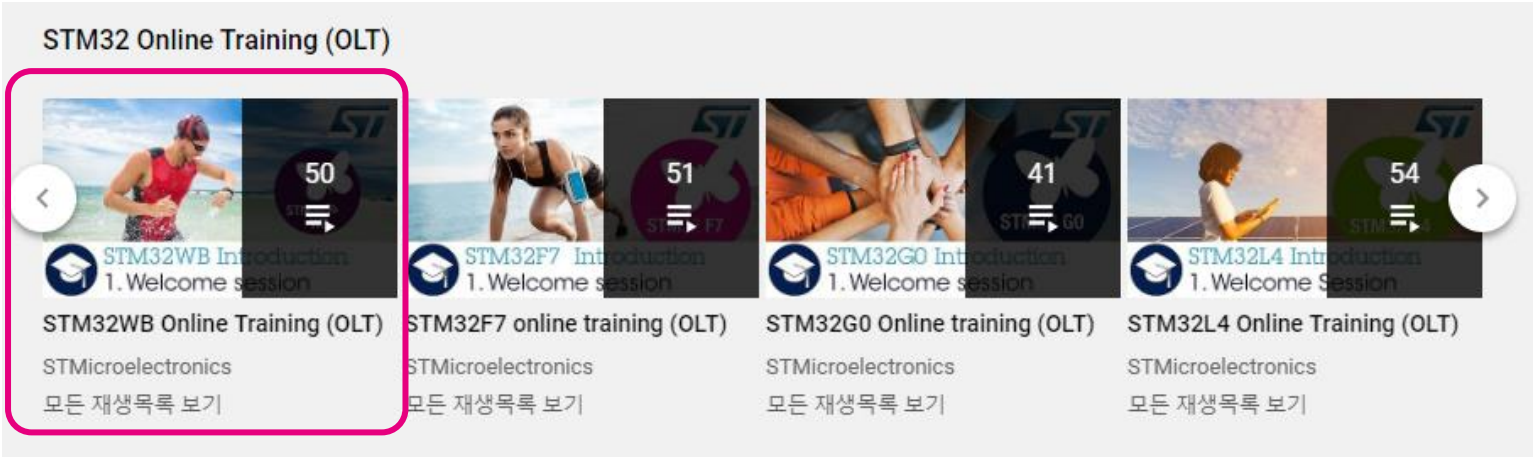
STM32 Online Training (OLT)

- STM32 Online Training
  - STM32G4 Online Training
  - STM32F7 Online Training
  - STM32L4 Online Training
  - STM32L4+ Online Training
  - STM32G0 Online Training
  - STM32WB Online Training
  - STM32H7 Online Training
  - STM32MP1 Online Training
  - STM32L5 Online Training





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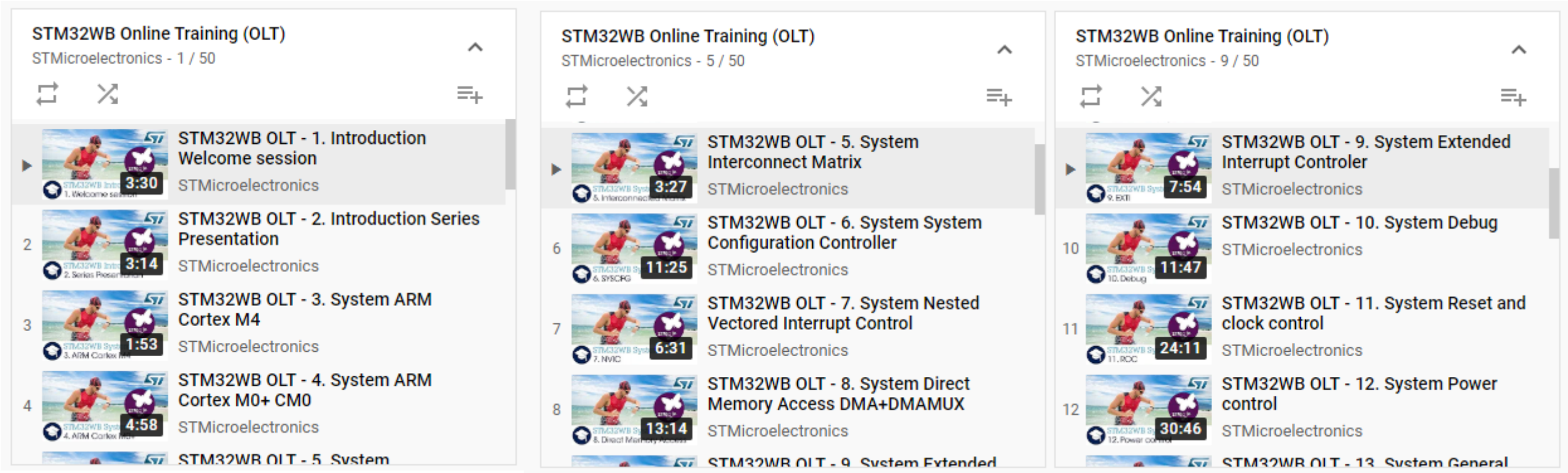
STM32 Online Training (OLT)



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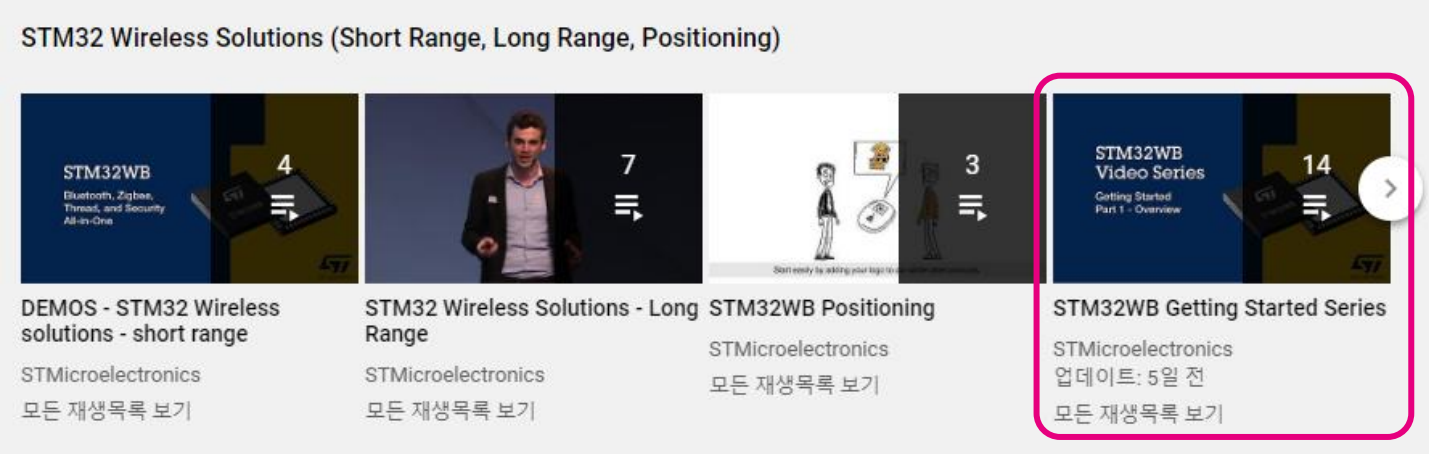
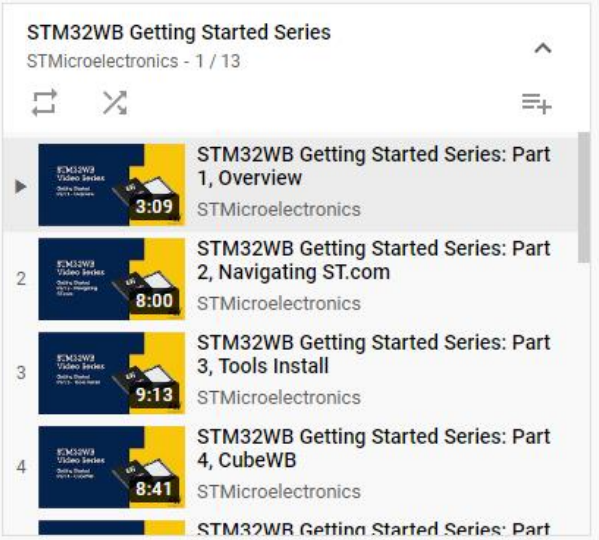
STM32 Wireless Solutions





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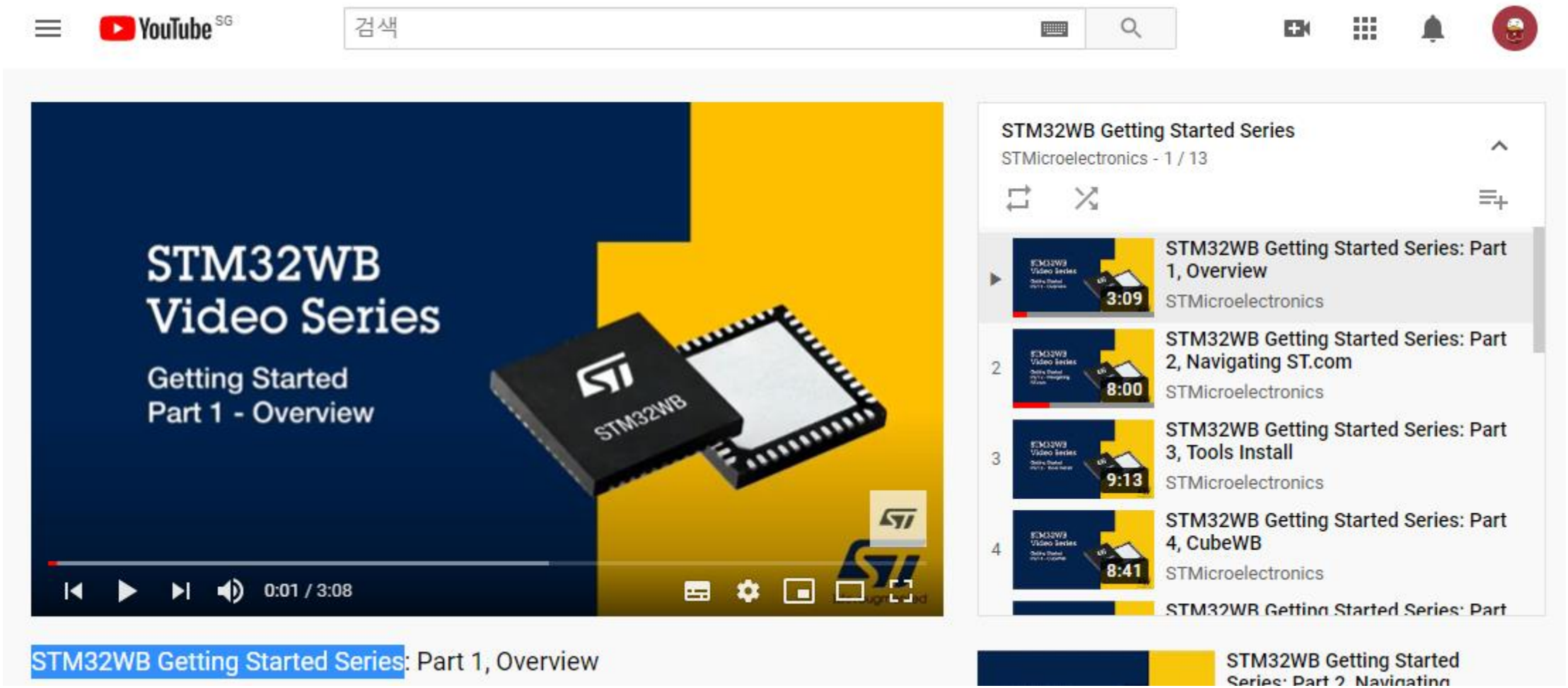
STM32WB Getting Started Series



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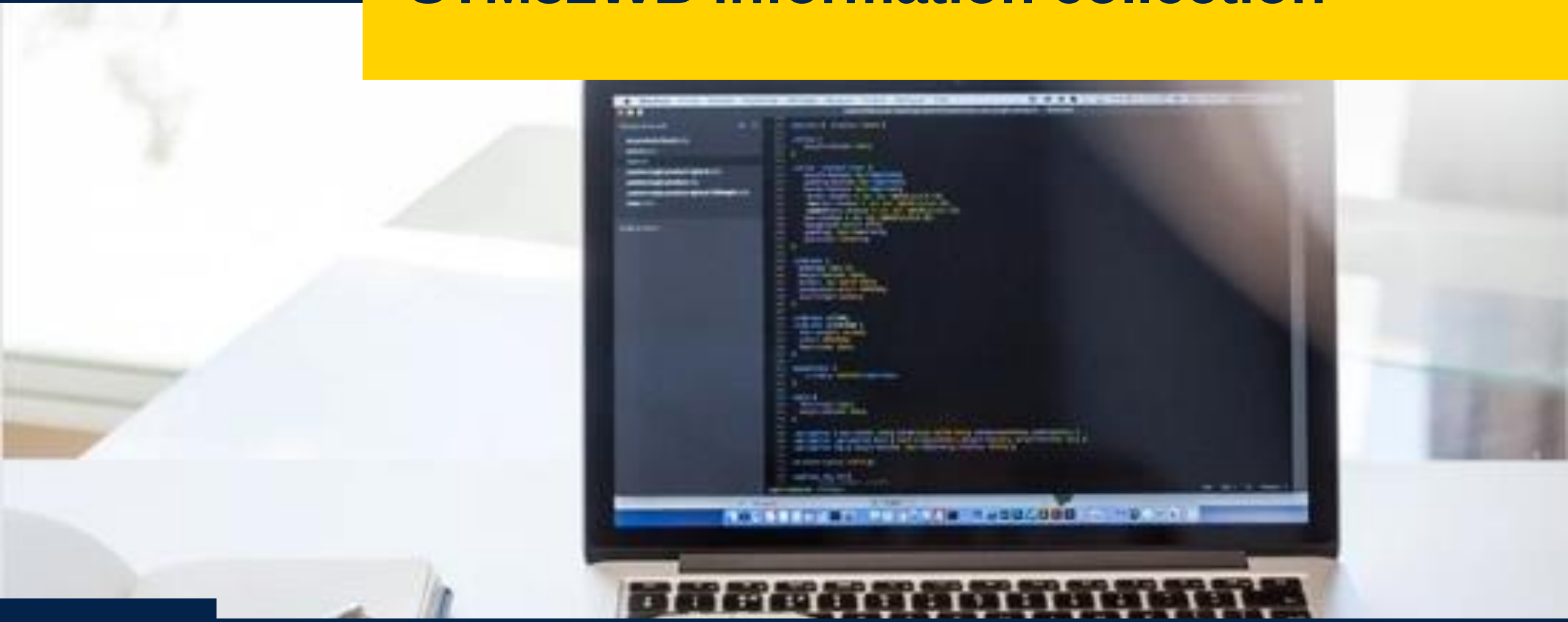
STM32WB Video Series - Getting Started

#6 CubeWB – P2P (Peer to peer)

Minku Yeo

STM32WB information collection



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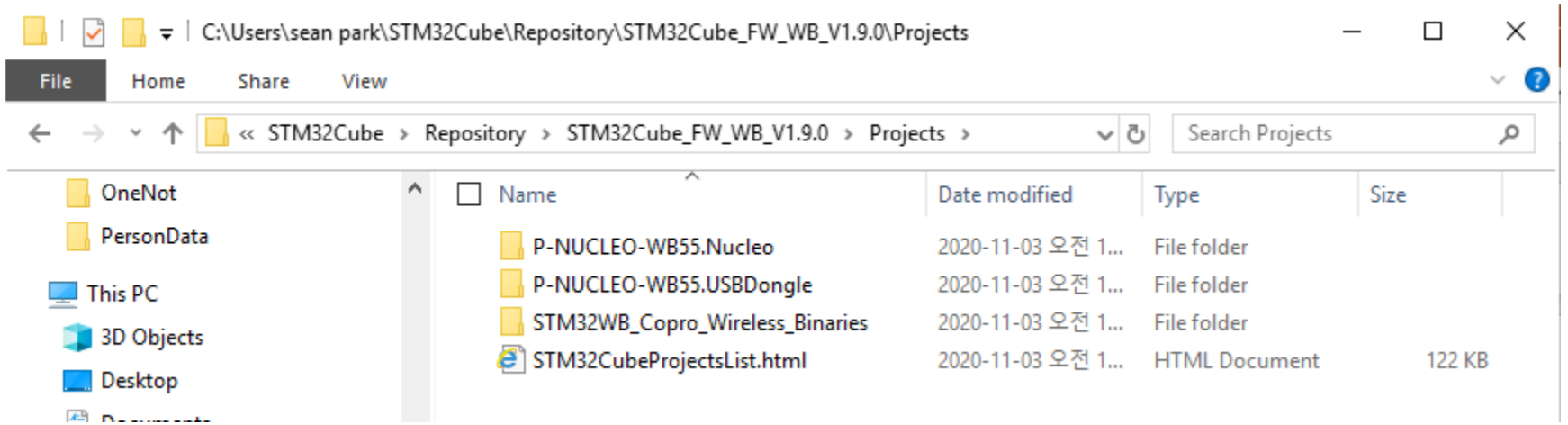
Where to find the examples

- Firmware package 에 포함된 다양한 예제 위치
  - c:/Users/[User]/STM32Cube/Repository/STM32Cube_FW_WB_Vx.y.z/Projects/[Board_Name]/Examples



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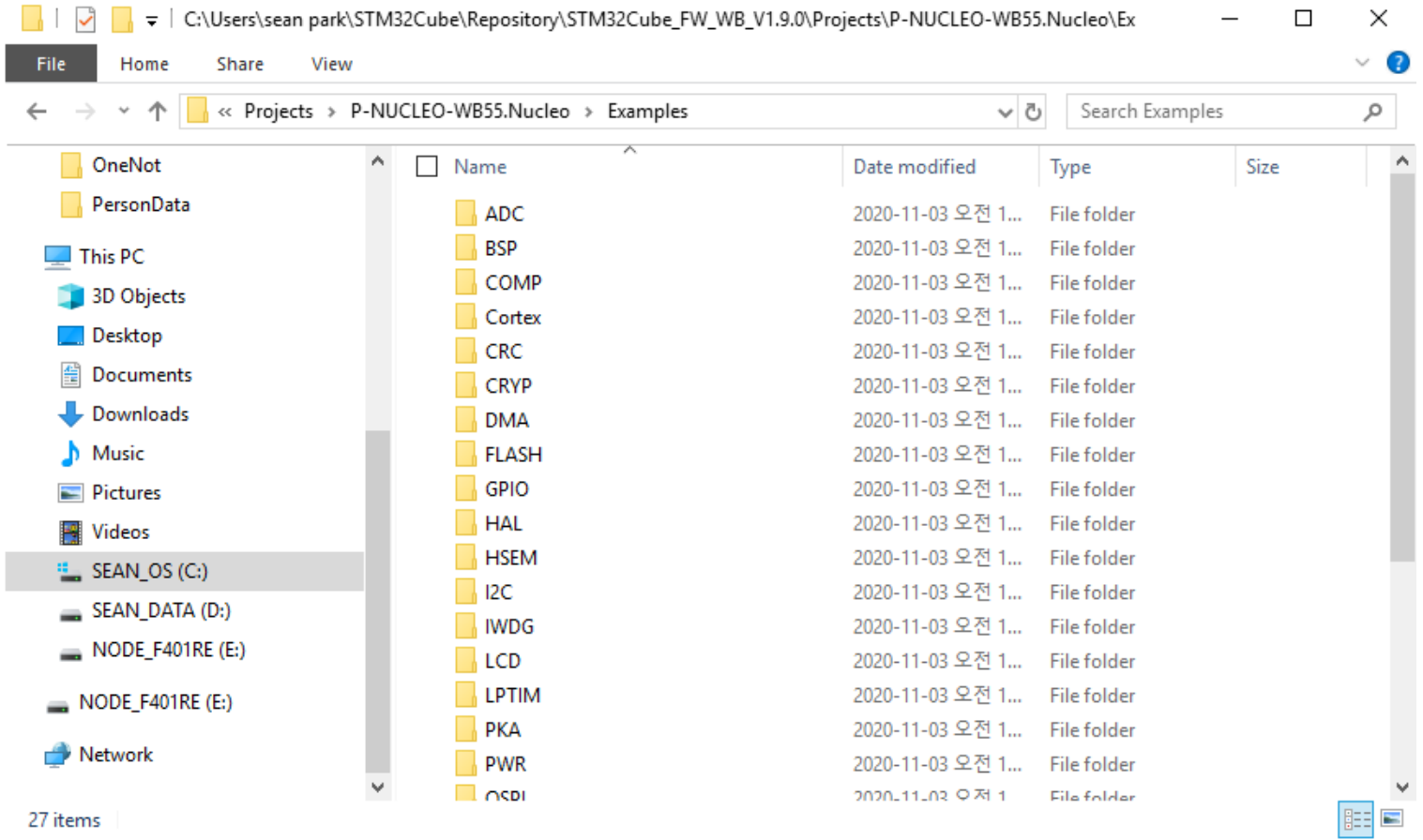
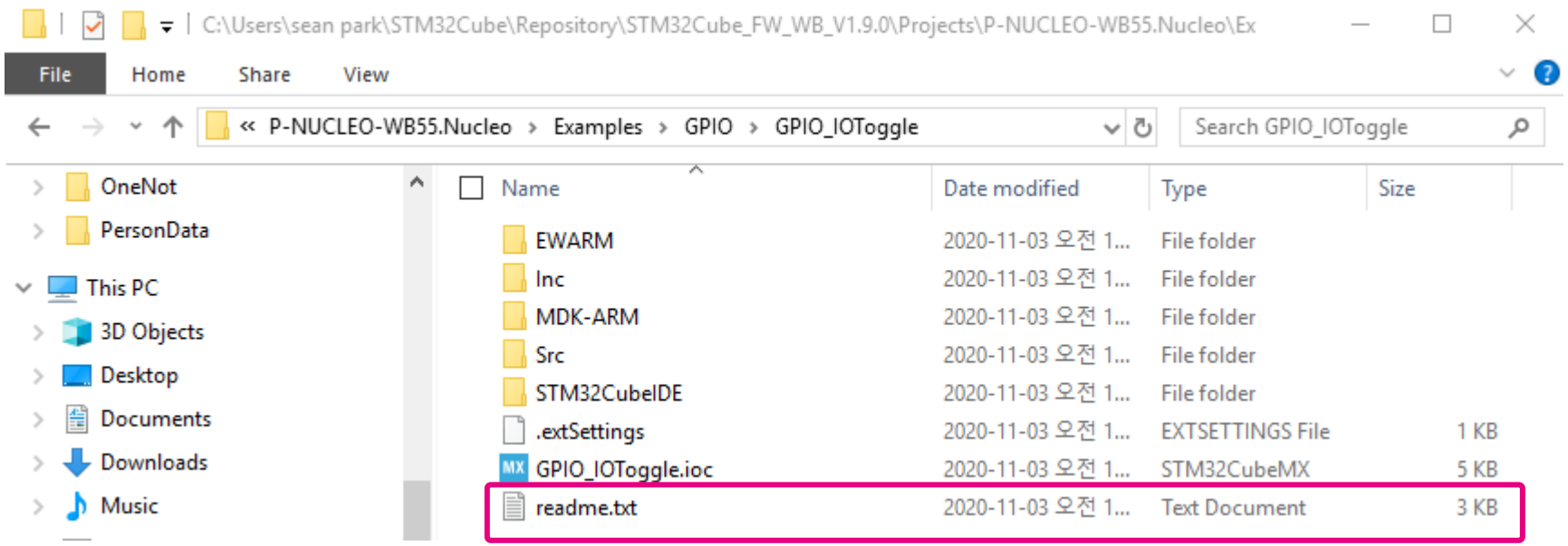


Where to find the examples

- Example 사용 설명서



Where to find the examples

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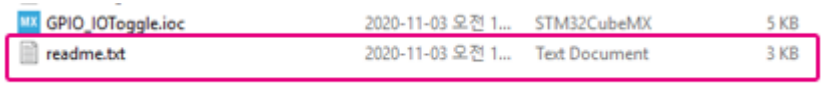


```
  ******************************************************************************
  @endverbatim

@par Example Description

How to configure and use GPIOs through the HAL API.

PB.00 and PB.05 IOs (configured in output pushpull mode) toggle in a forever loop.
On P-NUCLEO-WB55 board these IOs are connected to LED2 and LED1.

In this example, HCLK is configured at 64 MHz.

@note Care must be taken when using HAL_Delay(), this function provides accurate delay (in milliseconds)
      based on variable incremented in SysTick ISR. This implies that if HAL_Delay() is called from
      a peripheral ISR process, then the SysTick interrupt must have higher priority (numerically lower)
      than the peripheral interrupt. Otherwise the caller ISR process will be blocked.
      To change the SysTick interrupt priority you have to use HAL_NVIC_SetPriority() function.

@note The example needs to ensure that the SysTick time base is always set to 1 millisecond
      to have correct HAL operation.

@par Keywords

System, GPIO, Input, Output, Alternate function, Push-pull, Toggle

@par Directory contents

  - GPIO/GPIO_IOToggle/Inc/stm32wbxx_hal_conf.h    HAL configuration file
  - GPIO/GPIO_IOToggle/Inc/stm32wbxx_it.h          Interrupt handlers header file
```

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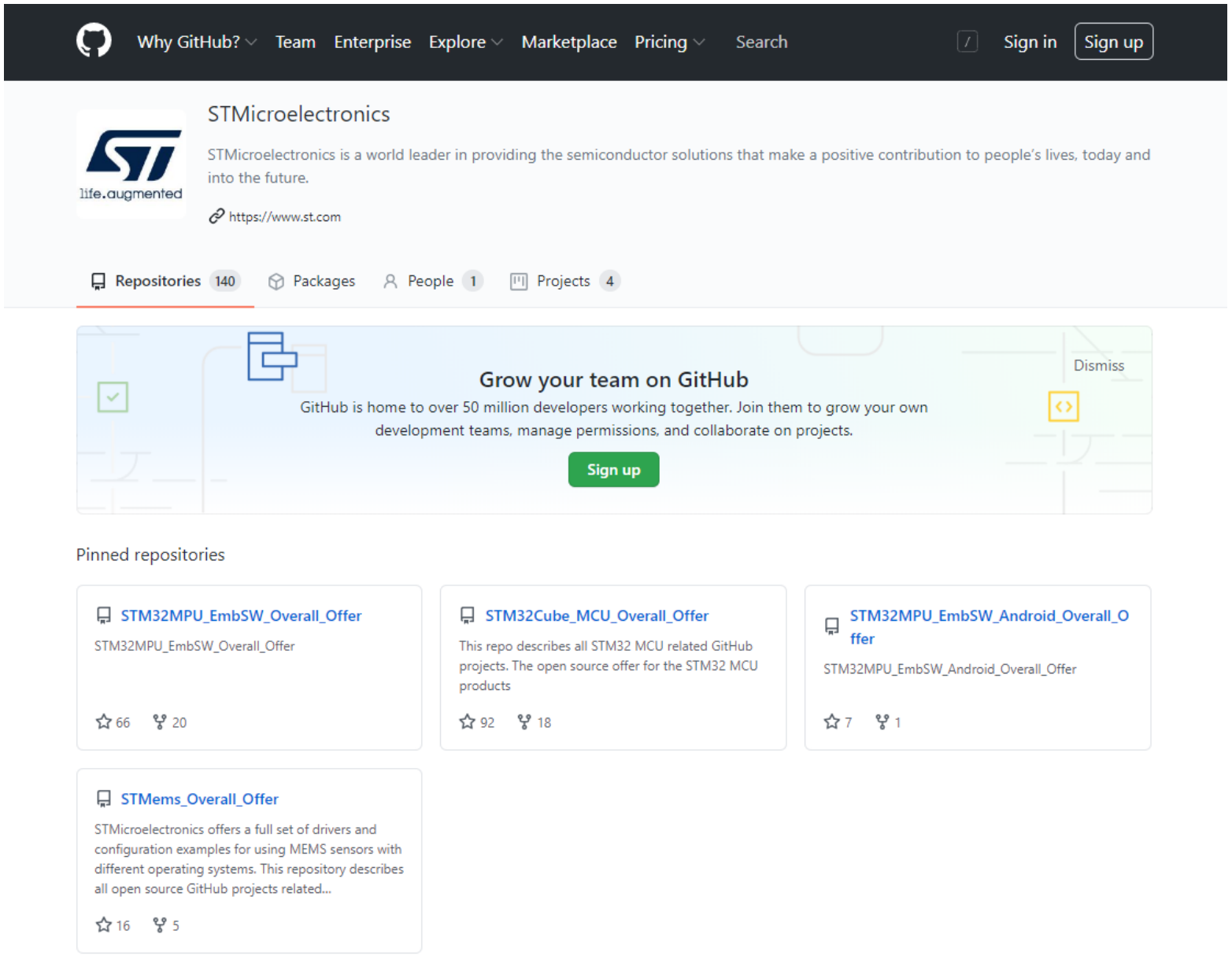
github.com/STMicroelectronics



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STM32CubeF4

STM32Cube MCU Full Package for the STM32F4 series - (HAL + LL Drivers, CMSIS Core, CMSIS Device, MW libraries plus a set of Projects running on all boards provided by ST (Nucleo, Evaluation and Discovery Kits))

stm32cube-mcu-package

C 76 173 15 5 Updated 10 days ago

stm32f1xx_hal_driver

Provides the STM32Cube MCU Component "hal_driver" of the STM32F1 series.

hal-driver stm32cube-mcu-component

C 6 3 0 1 Updated 10 days ago

STM32CubeF1

STM32Cube MCU Full Package for the STM32F1 series - (HAL + LL Drivers, CMSIS Core, CMSIS Device, MW libraries plus a set of Projects running on all boards provided by ST (Nucleo, Evaluation and Discovery Kits))

stm32cube-mcu-package

C 54 132 3 1 Updated 10 days ago

stm32f2xx_hal_driver

Provides the STM32Cube MCU Component "hal_driver" of the STM32F2 series.

hal-driver stm32cube-mcu-component

C 1 1 1 0 Updated 10 days ago

STM32CubeF2

STM32Cube MCU Full Package for the STM32F2 series - (HAL + LL Drivers, CMSIS Core, CMSIS Device, MW libraries plus a set of Projects running on all boards provided by ST (Nucleo, Evaluation and Discovery Kits))

stm32cube-mcu-package

C 5 12 0 0 Updated 10 days ago

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stm32cube-mcu-package stm32

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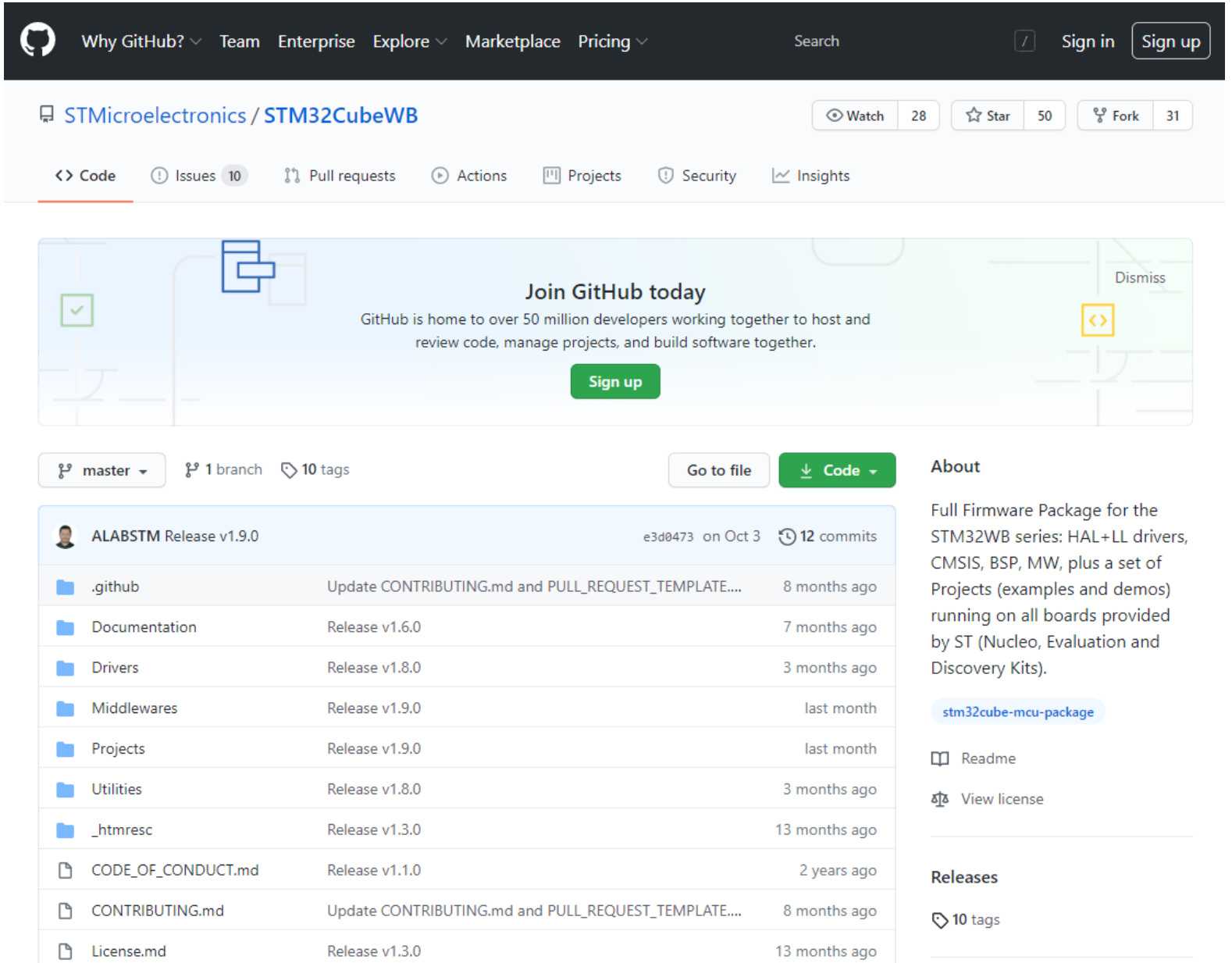
https://github.com/STMicroelectronics/STM32CubeWB



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STM32 Question

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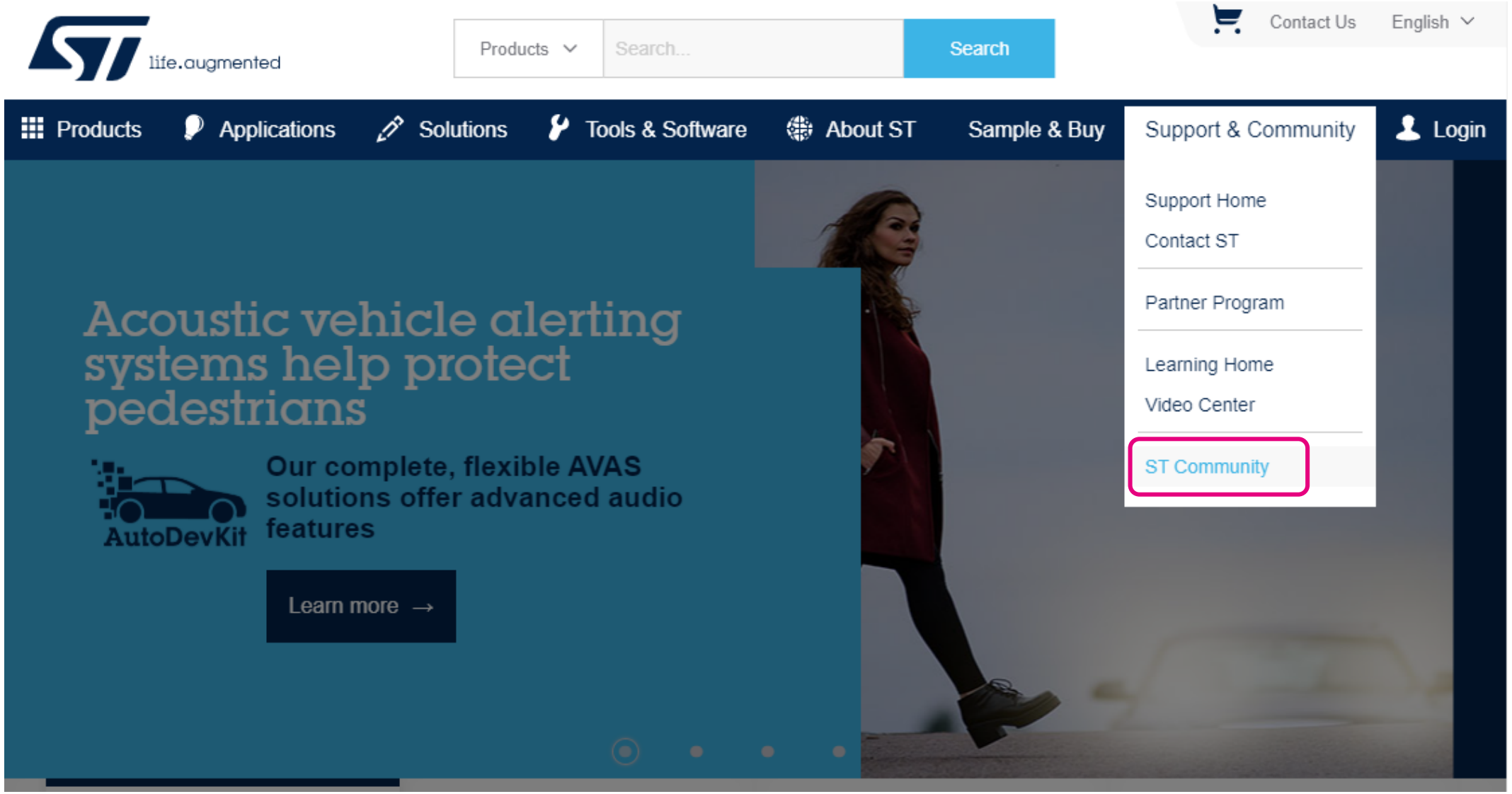
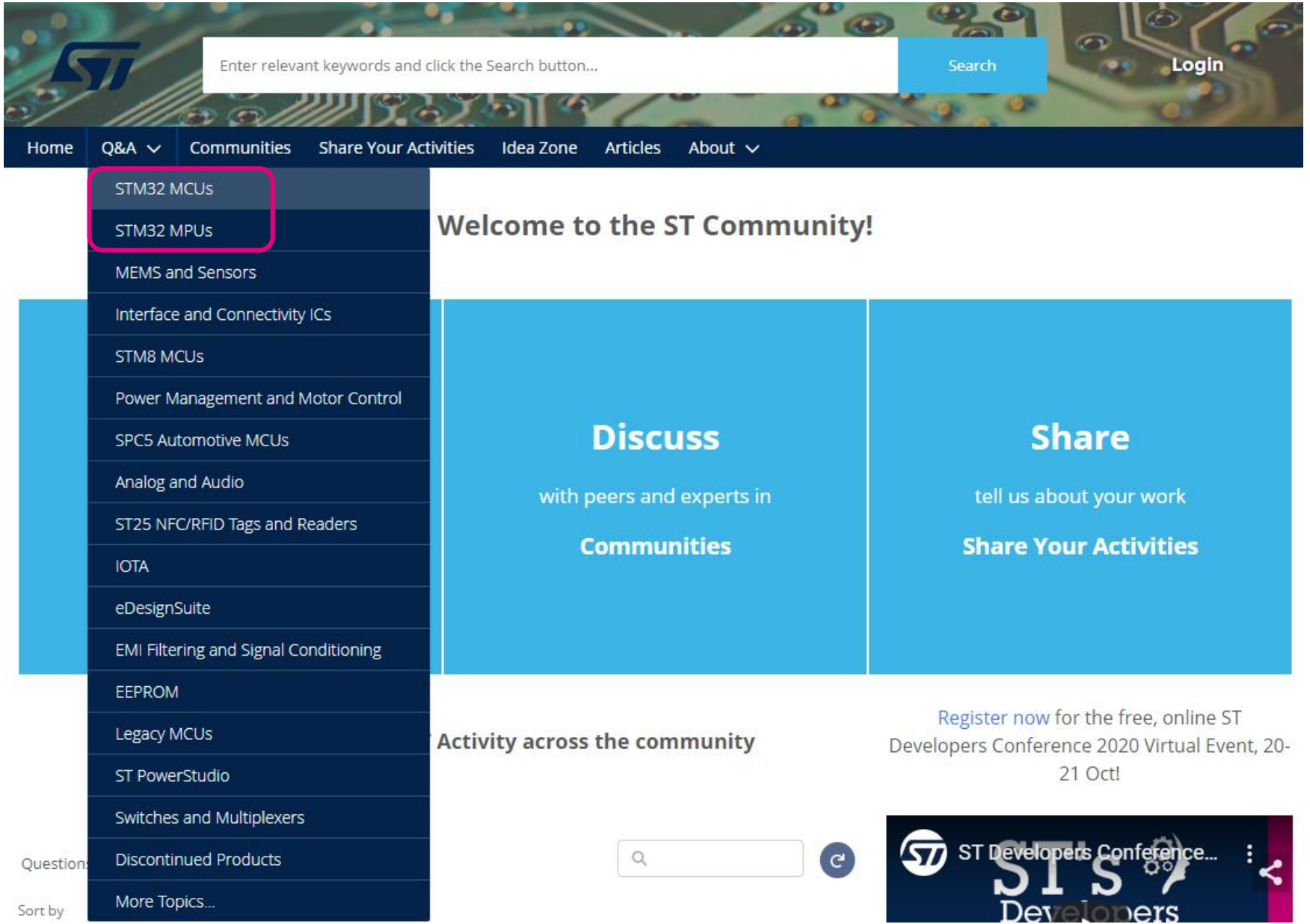
ST Community!



ST Community!



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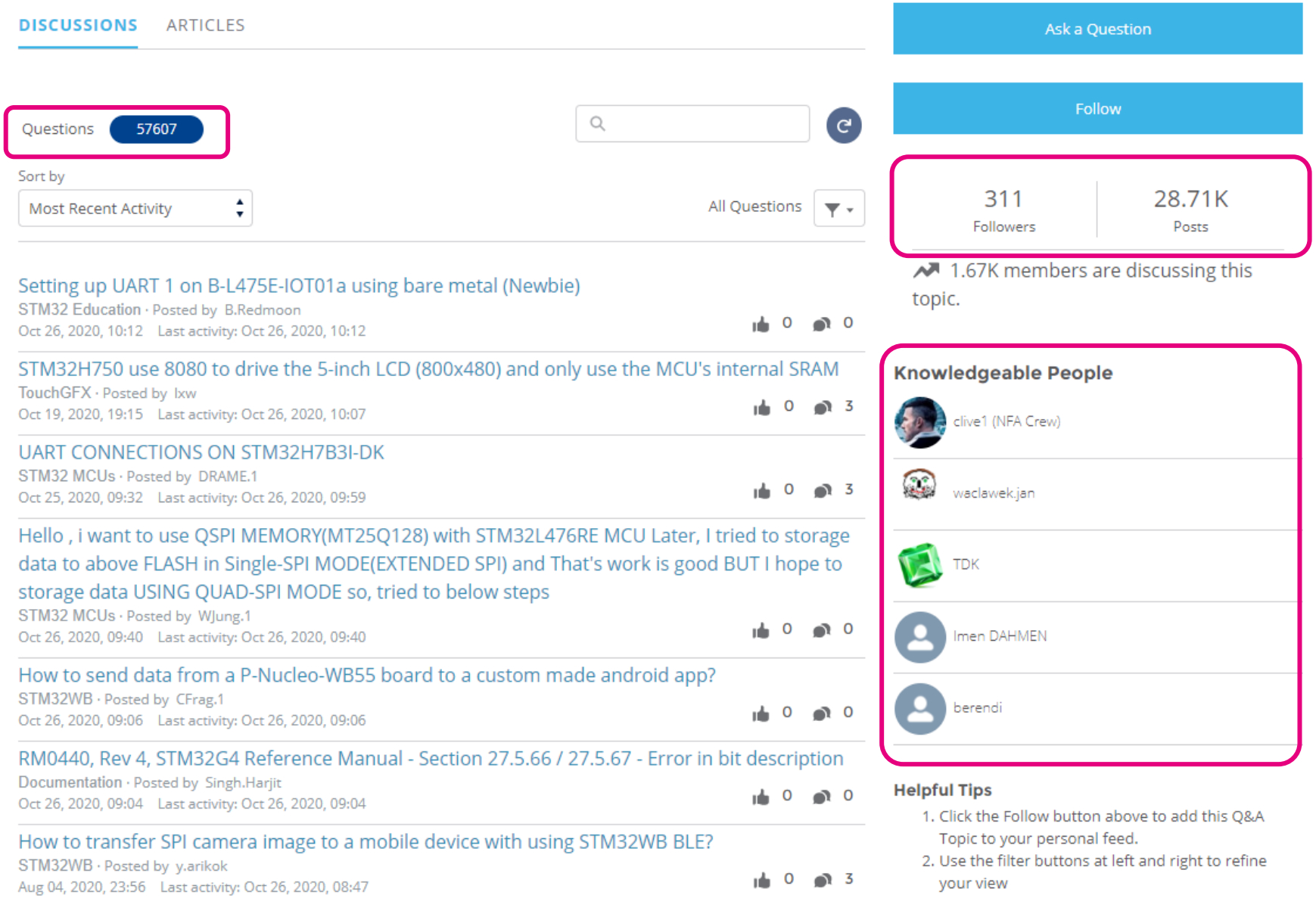

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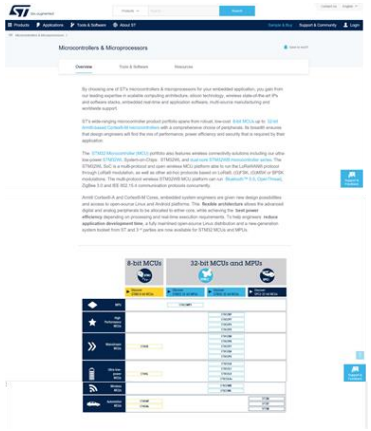
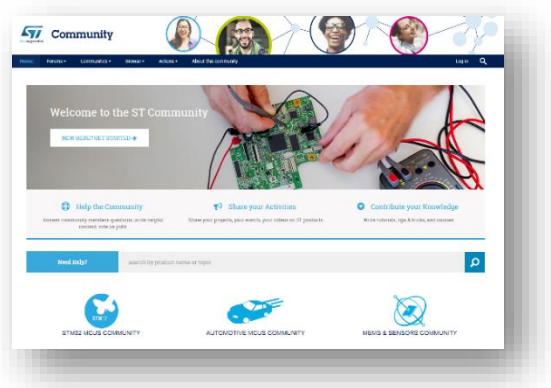


ST MCU Finder

community.st.com

github.com/STMicroelectronics



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QnA

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